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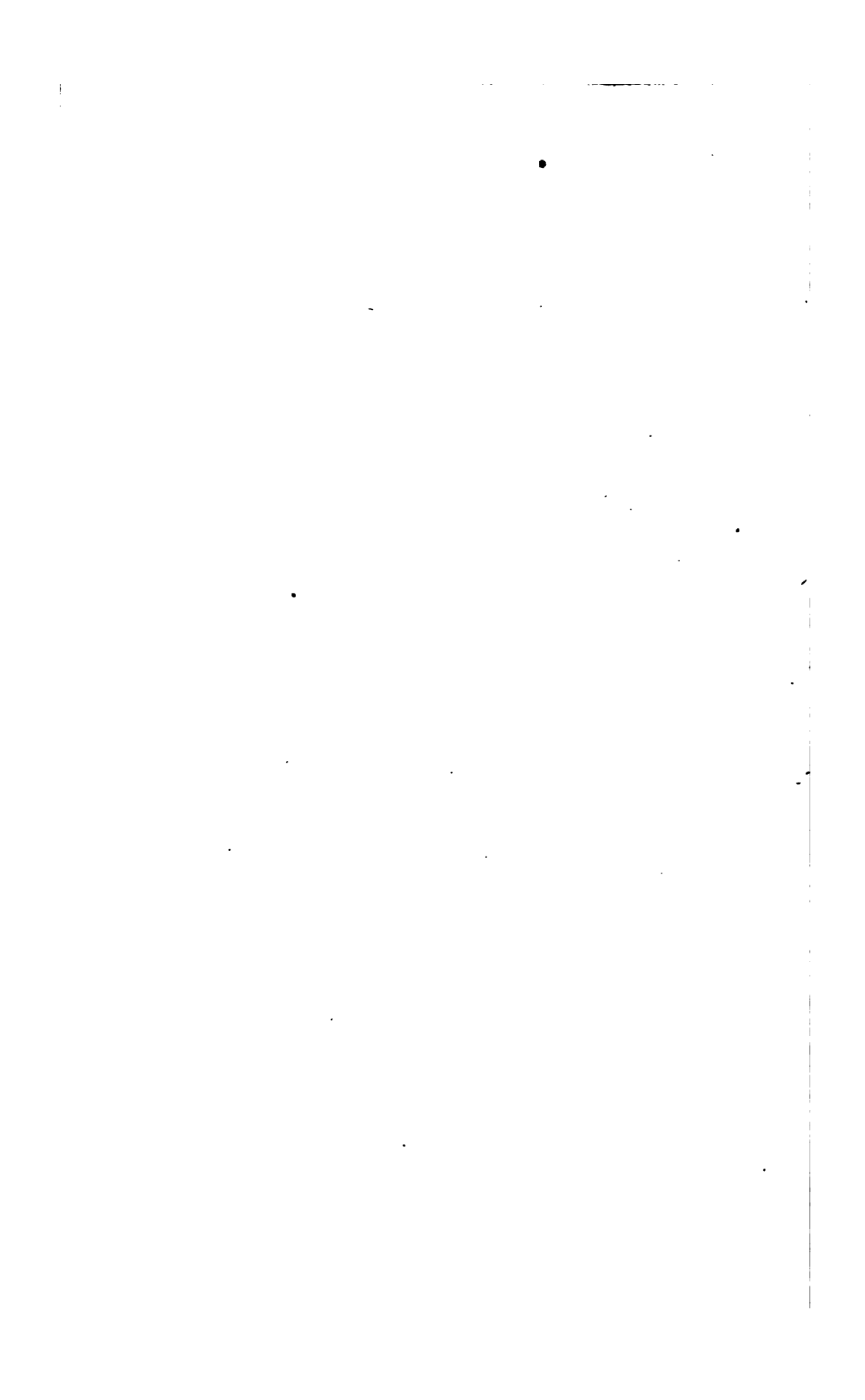
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AN ESSAY
ON THE
WEEDS OF AGRICULTURE:

WITH THEIR COMMON AND BOTANICAL NAMES;
THEIR
RESPECTIVE CHARACTERS AND BAD QUALITIES ;
WHETHER AS
INFESTING SAMPLES OF CORN OR ENCUMBERING THE SOIL;

ALSO
Practical Remarks on their Destruction,
BY FALLOWING-OR OTHERWISE.

THE POSTHUMOUS WORK OF
BENJAMIN HOLDICH, Esq.

LATE EDITOR OF THE FARMER'S JOURNAL.

EDITED
By G. SINCLAIR, F.L.S., F.H.S.,
AUTHOR OF HORTUS GRAMINEUS WOBURNENSIS, CORRESPONDING MEMBER OF
THE CALEDONIAN HORTICULTURAL SOCIETY OF EDINBURGH, OF THE
HONOURABLE THE BOARD OF AGRICULTURE OF STUTTGART, AND
NURSERYMAN, NEW-CROSS, NEAR LONDON.

SECOND EDITION.

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1826.



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TO
THE YOUNG FARMERS
OF
GREAT BRITAIN,

THE FOLLOWING PAGES

ARE MOST RESPECTFULLY INSCRIBED,

BY THEIR MOST OBEDIENT

AND VERY HUMBLE SERVANT,

THE EDITOR.

BOOKS QUOTED.

Sm. Engl. Fl. The English Flora, by Sir James Edward Smith, President of the Linnean Society, &c. &c. &c.—**Eng. Bot.** English Botany, by Sir James Edward Smith, President of the Linnean Society, &c. &c. &c., illustrated with figures, by James Sowerby, Esq.—**Hort. Gram. Wob.** Hortus Gramineus Woburnensis, or an Account of the Results of Experiments on different Grasses and other Plants, used as the food of the more valuable Domestic Animals, instituted by John, Duke of Bedford. Second Edition.—**Comp. Fl. Brit.**

ADVERTISEMENT.

New Cross Nursery, July 23, 1825.

G. SINCLAIR, Author of the "*Hortus Gramineus Woburnensis*," and Editor of HOLDICH'S *Essay on the Weeds of Agriculture*," begs leave to inform his Readers and the Public, that having entered into partnership with Messrs. CORMACK and SON, Nurserymen, Seedsmen, and Florists, New Cross, Surrey, and 53, Regent Street, London; (at the latter of which places he will be in regular attendance, and will feel much pleasure in supplying every requisite information, particularly on the subjects of Grasses and Planting;) and from possessing a very large and select stock of Fruit and Forest Trees, Evergreens, Flowering Shrubs, American, Hothouse, Greenhouse, and Herbaceous Plants, Bulbous Roots, &c.; and cultivating Seeds of every description, both for the Garden and the Farm; he ventures to solicit the honour of their patronage; and with confidence assures them, that all Orders* transmitted to the

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fallows, as practised by Mr. Robert Dickson of Kidbrook,
Blackheath. By the Editor.

THEORY

1. INTRODUCTION

The purpose of this study is to investigate the effect of the independent variable on the dependent variable. The study is based on the following hypotheses:

H₁: There is a positive relationship between the independent variable and the dependent variable.

H₂: There is a negative relationship between the independent variable and the dependent variable.

H₃: There is no significant relationship between the independent variable and the dependent variable.

The study is based on the following assumptions:

1. The data is normally distributed.

2. The data is homogeneous.

3. The data is independent.

4. The data is continuous.

5. The data is measured on a ratio scale.

6. The data is measured on an interval scale.

7. The data is measured on a nominal scale.

8. The data is measured on an ordinal scale.

9. The data is measured on a categorical scale.

10. The data is measured on a qualitative scale.

11. The data is measured on a quantitative scale.

12. The data is measured on a mixed scale.

13. The data is measured on a multi-scale.

14. The data is measured on a complex scale.

15. The data is measured on a multi-dimensional scale.

16. The data is measured on a multi-level scale.

17. The data is measured on a multi-layer scale.

18. The data is measured on a multi-stage scale.

19. The data is measured on a multi-step scale.

20. The data is measured on a multi-point scale.

21. The data is measured on a multi-line scale.

22. The data is measured on a multi-surface scale.

23. The data is measured on a multi-volume scale.

24. The data is measured on a multi-weight scale.

25. The data is measured on a multi-length scale.

26. The data is measured on a multi-width scale.

27. The data is measured on a multi-height scale.

28. The data is measured on a multi-depth scale.

29. The data is measured on a multi-breadth scale.

30. The data is measured on a multi-range scale.

31. The data is measured on a multi-span scale.

32. The data is measured on a multi-reach scale.

33. The data is measured on a multi-coverage scale.

34. The data is measured on a multi-impact scale.

35. The data is measured on a multi-effect scale.

36. The data is measured on a multi-outcome scale.

37. The data is measured on a multi-result scale.

38. The data is measured on a multi-benefit scale.

39. The data is measured on a multi-gain scale.

40. The data is measured on a multi-profit scale.

41. The data is measured on a multi-loss scale.

42. The data is measured on a multi-cost scale.

43. The data is measured on a multi-expense scale.

44. The data is measured on a multi-revenue scale.

45. The data is measured on a multi-income scale.

46. The data is measured on a multi-wealth scale.

47. The data is measured on a multi-poor scale.

48. The data is measured on a multi-rich scale.

49. The data is measured on a multi-poor scale.

50. The data is measured on a multi-rich scale.

PREFACE BY THE EDITOR.

THE following Essay, in an imperfect state, the first chapter only being perfected in manuscript by the Author, was bequeathed to the care of the present Editor, who has endeavoured, as much as in his power, to supply what was wanting to complete the original design. The Author's introductory remarks explain the origin of the Essay; viz. the inquiries of a "Young Farmer" for a Treatise on Weeds.

As Mr. Holdich was a practical farmer of very great ability, as well as a man possessing the most extensive and correct knowledge on rural affairs, which knowledge he acquired solely by his own industry and application, united to superior natural talents, and which procured him the approbation of the public, as well as that of the personal friendship of the first agriculturists of the day, I may be permitted here, for the information of those Gentlemen to whom these pages are inscribed,

to state a few particulars of his life, chiefly from memoranda left in his own hand-writing.

Mr. Holdich was the son of a respectable farmer of Thorney, in the isle of Ely, and born in Nov. 1770. His education was wholly confined to reading, writing, and arithmetic; and though, at the age of fourteen, he was placed for one year at a country boarding school, where he learnt the practical parts of the mathematics, yet in that school, as he informs us in his *Memoranda*, the very sound of the word *grammar* was never heard. At fifteen, he was taken home to be employed in farm labour of every description. Two or three years afterwards, he learned, by correspondence with a former schoolmate, that there were such things as *parts of speech*, nouns, adjectives, &c., and that the verb must agree with its nominative, &c.; this was a very great surprise and pleasure. Louth's Grammar, and Perry's School Dictionary were soon procured, in which the rules and examples were both plain and pleasing. The books in his father's possession were very few, but the son borrowed wherever he could, and never went into the field without some in his pockets. The progress of acquaintance, with

the advancement of youth to manhood, which naturally sends all young men in pursuit of their peculiar desires, directed him to a depository of books, which in such a county, and at such a time, might be dignified with the name of a library. These were—ancient history, the best translations of ancient poetry, mythology, most of the English poets, &c., with the best periodical papers of the day. This propensity in a great measure divided him from the society of his father and friends, and all his *leisure* was spent in the society of educated persons: it also contributed, with some other circumstances, joined to the spirit of the times (1793), to occasion him to emigrate to America, for which purpose his father liberally supplied him, and where he remained seven years, visiting most of the states, and the then uninhabited western territory. He returned to England, married, and settled in his native parish as a farmer, 1801—2.

His farming business did well up to 1813, and his small fortune had felt a prosperous increase. At the conclusion of the war, with the cessation of the great demand for agricultural produce, and the importation of foreign

corn, began those outcries, and consequent distresses, which in their progress filled the whole kingdom with alarm. His letters, about this period, in the *Farmer's Journal*, procured him the situation of Editor to that useful and respectable paper. In 1817, the downfall of the prices of agricultural produce, the depreciation of the currency, and the continuance of taxes and expenses at their former rates, notwithstanding the liberal reduction of rent by his revered landlord, the DUKE OF BEDFORD, his capital, as he informs us, in common with the farmers of great Britain, was greatly reduced.

In connection with his situation as Editor of the *Farmer's Journal*, he attended most of the agricultural meetings in England, and without the aid of short-hand writing, and even scarcely of notes, his reports, as published in that useful paper, were remarkable for their clearness and minuteness of detail—so powerful was his memory and vivid his imagination. In all the private relations of life Mr. Holdich was exemplary. The change of air, confinement, and mental exertion, were productive of bad effects to his health, inducing a bronchial affection, which at last terminated fatally, in the spring of 1824.

A fate somewhat singular attended Mr. Holdich's productions in polite literature; and because it may be possible that some of them may hereafter appear in some shape, the MSS. and their fate are here set down from his own Memoranda.

1st. *Emigration, or the Reward of Virtue*; a comedy in five acts, written in America, and offered to Mr. Harris in 1800, by whom it was politely declined—lost, by being lent to Mr. Cobbett in 1801, to be published as a rejected play.

2nd. *The advantages of a Wife*; a comedy in two acts, represented at the Philadelphia theatre in 1799. The copy-right in America was purchased by Mr. Wignell, but the MSS. probably perished in the conflagration of that theatre: a few years afterwards a copy was brought to England, but lost from being lent to a friend to read.

3d. *Gabriel Gruel, or the History of a perfect Philosopher*; a burlesque, in the manner of a *Tale of a Tub*—lost, by being lent to Mr. John Scott, editor of the *London Magazine*, who was unfortunately killed in a duel.

Mr. Holdich wrote the literary part of *Poor Robin's Almanack*; from 1804 to 1809.

The papers he bequeathed to the present Editor were—

1st. A new Practical System of British Grasses.

2d. A Practical System of British Plants.

3d. The first chapter of the following Essay on Weeds, with a few detached hints and memoranda.

The name Weed being only a relative term, and in the sense it is here used, viz. the “Weeds of Agriculture,” is very extended or comprehensive. To have enumerated all the plants which, in one department or other of the art, might fall under the name of Weed, would have required the enumeration of a principal part of the whole British Flora; as regards utility, which is all that is aimed at here, as well as being contrary to the design of a manual, this would have been unnecessary.

It may be said, that after the manner in which the subject has been treated by Mr. Pitt, in his Essay; by Professor Martyn, in his edition of Miller’s Dictionary; and particularly by Sir John Sinclair, in his great national work, the Code of Agriculture, (which should be in the hands of every farmer,)—this publication was uncalled for; yet, nevertheless, it has

been called for, and it is surely unnecessary here to mention the great advantages of a manual on a subject of so much importance to good husbandry, and which cannot be too often or too early impressed on the minds of Young Farmers, for whose especial use the Author designed his Essay.

It may be proper here to add, that all the profits of the Work, after publication, go to the benefit of the Author's Widow and Family.

New Cross Nursery, July 28th, 1825.

ESSAY, &c.

INTRODUCTION.

It has happened, (it seems very strangely,) that an Essay on Weeds and their destruction has never been published. During the continuance of the Board of Agriculture, an Essay of this kind was sent to the Board, by Mr. Pitt, of Wolverhampton, containing a pretty long catalogue, but with many important omissions, and without any practical arrangement. Mr. Pitt understood botany very well, but knew little of agriculture. His Essay is to be found in the fifth volume of the Communications to the Board of Agriculture, printed in 1806.

It seems also somewhat strange, at this advanced period of agricultural knowledge, that so many queries should be put, "How to destroy black-grass?"—"How to destroy coltsfoot?" &c.; as if there were any secret known to a few, or any charm in existence, by which an overwhelming increase of any particular weed could be stopped at once. But the world is always in a state of pupilage; some are learning what others know;

and the queries which to the young are interesting, are to the experienced and wise trifling and superfluous. So it must be with essays on agricultural subjects, which can only be directed to the general instruction of the inexperienced; while the practiced and sagacious agriculturist must be requested to pardon the particularity with which things well known to him are so tediously written down.

To these queries it is owing that this Essay has been attempted. In the Farmer's Journal of August 25, 1823, a gentleman from Durham wrote to the Editor as follows: "Would any of your numerous correspondents point out a work as a book of reference for the destruction of weeds, to which a young farmer might refer? It should be alphabetical, with the Linnæan and provincial names, and the best mode of extirpating them." To this correspondent it could only be answered, that there was no such book; but on a little reflection, it appeared highly desirable that such a book should be written; and the result is this Essay. It did not appear, however, that an *alphabetical* arrangement was required; but rather, that a proper division of weeds as to their agricultural character and demerits, would be more useful, and would lead the inexperienced reader more readily to what he desired to find.

The weeds of agriculture are very numerous, but by far the greater part are underlings, and are little noticed; these are comparatively innocent, and a very great portion of them have no local or

common names. Mr. Pitt's list contains 55 weeds, and it might have been greatly extended; but few farmers, whose knowledge is bounded by the soils they respectively cultivate, would think themselves troubled with more than from a dozen to twenty: that is, four or five, the seeds of which infest their samples of corn; four or five which trouble them in their fallows; and a few besides, which are locally prevailing and obtrusive, but (as seems to have been too generally considered) *not very hurtful*. The fact was, before the improved agriculture became so generally known, that those weeds which did not hurt the samples, the farmers cared little about; not considering how much they hurt the crops: and hence it has been, that on the different soils, Corn-poppy, Charlock, Blue-bottles, Corn-marigold, May-weed, &c. have been suffered to abound.

The weeds of agriculture may be divided into, 1st. Those which infest samples of corn; 2d. Rooted or fallow weeds, and such others as are hard to destroy; 3d. Those which are principally objectionable as they encumber the soil; 4th. Underling weeds, such as never rise with the crop, nor come into the sickle. Under these heads, each weed in its respective division will be treated of as to its deteriorating qualities and mode of destruction.

CHAPTER I.

OF WEEDS WHICH INFEST SAMPLES OF CORN.

THE weeds of this description do not exceed ten in number, and it very rarely happens that more than two sorts are found associated in one sample of wheat. They vary as to soil so much, that some of the worst weeds in fens and marshes are not known at all on clay cold soils, and are but very little seen on any sort of dry turnip land. Light loams and deep, loose soils generally have most weeds by nature. It seems therefore desirable to divide weeds also as to the soils on which they prevail; but this may be supplied by proper remarks added to each.

Weeds which infest the sample are, No. 1. Darnel; 2. Cockle; 3. Tares; 4. Melilot; 5. Wild Oats; 6. Hariff; 7. Crow-needles; 8. Black-bindweed; 9. Snake-weed; 10. Charlock-seeds, in barley sometimes.

1. DARNEL. (*Bromus secalinus*.) Smooth Rye Brome-grass. Panicle spreading, slightly subdivided below; spikelets ovate, about ten, distinct, somewhat cylindrical; florets smooth; awns wavy, shorter than the glumes; leaves slightly hairy. Sm. Engl.

Fl. vol. i. p. 151; Engl. Bot. t. 1171;
Host, Gram. vol. i. t. 12.

Bromus mollis. Soft Brome-grass. Panicle erect, rather close, compound; spikelets ovate, downy; florets imbricated, depressed, ribbed; awns as long as the glumes; leaves and sheaths very soft and downy. Sm. Engl. Fl. vol. i. p. 153; Engl. Bot. t. 1078; Hort. Gram. Wob. fol. ed.; 2d ed. p. 176.

This frequently grows in fields, but it is most hurtful among rye-grass which is mowed to thrash. In the sample the seed is bigger and broader than the rye-grass, and has a short awn. It is just so heavy that it escapes the degree of wind which rye-grass will bear, and therefore infests the samples as they are offered by farmers; but the seedsmen, who buy large quantities, take it out by means of a sieve which lets the rye-grass through. This weed in the fens is called cock-grass. In the Essay of Mr. Pitt, he treats of darnel as a plant which he had often seen in wheat-crops, and perfectly well knew. Dr. Withering, in his Botany, also mentions that this darnel (*Lolium temulentum*) is "common in corn-fields, mostly among barley and flax;" and "that it is a very troublesome weed among wheat, in Norfolk and Suffolk." [On the authority of Mr. Woodward.] The Doctor also describes another species of *Lolium* (*L. arvense*) as being much like the other, only it is smooth, and calls it *white* darnel: he observes, that it is common in many

parts and places, and “very injurious to a crop of wheat,”—for which he quotes Mr. Pitt’s authority. Mr. Pitt, indeed, names his darnel, white darnel, but immediately calls it *Lolium temulentum*. Both these are annual, and flower in July and August. The *Bromus secalinus* and *Bromus mollis* are the darnel of British agriculture: Dr. W. observes, that the former “is very troublesome among wheat in Norfolk, where it is called *drank*.”

Now, it seems never to have occurred to writers on this subject, that when they were in any difficulty about agricultural weeds, they should have recourse to the characters of the seeds of the plants. It is quite impossible that any grass seed should be darnel, either ancient or modern, unless the seeds are heavy enough to resist the operations of *dressing*, and to remain in the wheat, in part, in spite of all efforts to get rid of them. The ancients had wind and sieves, and they no doubt exerted themselves as much as possible to rid their wheat of such seeds as those of the *L. temulentum*, while such deleterious effects are ascribed to them, if baked in bread, &c. It is said, that if the bread be eaten hot, headach, loss of strength, vertigo, and death, may ensue; and if brewed in beer, that they cause sudden intoxication. Our British darnel never caused any such effects. But really, if we had a native grass, producing seeds as fit for brewers’ use as *nux vomica*, a much greater noise would have been made about it before now. The barley-growers need not eradicate the plants, because their samples, *with*

plenty of darnel, would bear the better price. Of these two species, Dr. Withering observes, that the one is awned, and the other smooth; but whether he speaks of the *seeds* we do not know. It is true that the seeds of the *L. temulentum* have long awns, which are likely to assist their discharge by dressing; they are also plump, and may be heavy; but the very terms of these being *common in samples*, and, as Mr. Pitt says, “never found unless sown with the seed-corn,” require that they should resist all our efforts of dressing, as the true darnel does.

Whether these plants be common in corn-fields in any part of England, or whether, if they be, their seeds are heavy enough to remain in samples of wheat and barley, must here be left undecided. I can only say, that in all my experience, and as far as I have ever seen or heard from practical authority, I know of no darnel but the *Bromus secalinus*, and, less generally, the *Bromus mollis*, now to be treated of.

Darnel is an annual plant, being in growth and appearance similar to corn, until it puts forth its characters of fructification. It really gives no trouble, for it generally grows (where it does grow) thinly scattered, and you cannot weed it out. It is true, that it is seldom found but where it is sown with the seed corn; but where you sow it you are sure to have it in the crop.* About

* The soft brome-grass perfects its seed earlier than the *drank* or smooth rye brome-grass, and the seeds are, for the most part,

the time that corn comes in ear, or rather later, the darnel throws out its flowering panicles, which, as the corn ripens, droop, each spikelet with its heavy load of seeds; these drooping spikelets are somewhat short, and nearly smooth, with the seeds thereon crowded, and the spikelets flat. When ripening, the leaves drop away, and the straw looks clear and handsome, much like good, bright oat-straw. The seeds resemble the boldest and best seeds of good rye-grass, but are thicker and much heavier; they contain a large quantity of nutritious flour, and fowls, pigs, and horses, are very fond of them.

The objection to darnel, with the miller, is, that it grinds tough, and perhaps somewhat soapy, so as to dull the stones. A very plump and dry sample of wheat is readily saleable, though with a *little* darnel in it; but a sample rough in hand, is lowered in value from a shilling to eighteen pence per quarter. Great care ought to be taken not to sow these seeds with wheat; in any spring crop I have never seen it grow. The name of *drank* (or more commonly *drauk*), given to this weed as being common in Norfolk, is a name by which darnel is known and called in many parts of England.

2. COCKLE. Corn-campion. (*Agrostemma githago*.) Whole plant, except the petals and capsule, covered with soft hairs; calyx

shed before the harvesting of grain crops; this weed, therefore, in corn crops, is less pernicious than the *Bromus secalinus*.

longer than the corolla; petals entire or slightly emarginate, and naked. Engl. Bot. vol. ii. t. 741; Wither. Arr. 471.

A well-known annual weed, of rather an ornamental appearance, bearing purplish red flowers. In spring its leaves are long, downy, and slender, and the plant is strong and conspicuous at weeding time. It grows somewhat tall before it branches, and is in full flower and bearing when the wheat is ripening, growing two feet and a half high. The seeds are very numerous, and contained in bulky capsules; they are black and rough, resembling a rolled-up hedgehog, and are nearly as big as small wheat kernels; they are filled with white flour, and very heavy. The miller's objection to these seeds is, that their black husks break so fine as to pass the boulders, and render the flour specky; also, because the seed is bulky, if there be much in the sample, it detracts considerably from the produce in flour: whatsoever is not wheat, must lower the value of that which should be all wheat.

It is the duty and interest of farmers to meet their customers the millers with clean samples; for the latter never forget to make use of every objection to beat down the price. "I would give you the other shilling if it were not for the *cockle*," is a common conclusion to one of these bargains: so a farmer having a hundred quarters of wheat grown in one field, loses five pounds by *sowing a little cockle*.

3. MELILOT. *Trifolium melilotus officinale*; *Melilotus officinalis*; *Melilotus officinale* of authors. Common Melilot-clover. Legumes racemed, naked, two-seeded, wrinkled, acute; stem erect. Engl. Bot. vol. xix. t. 1340; Wither. Arr. 645; Sm. Fl. Brit. 781; Hort. Gram. Wob. fol. ed. Sometimes called King's Clover and Hart's Clover.

This is an annual plant, growing with an upright stem, about two feet high, branched and furrowed. The capsules containing the seed are very tough and wrinkled, growing in bunches; each capsule is generally one-seeded, sometimes two, but thrashing does not dislodge them; so that in samples of wheat, the wrinkled capsule is called the seed.

This is of all others the most pernicious seed in wheat, a few seeds communicating a very strong smell to the flour. The plant is addicted to stiff soils, and often grows on ditch banks in the fences; it blossoms yellow. It is very palatable food to all sorts of cattle, and has a grateful odour when cut down and dried. Nevertheless, as a weed in arable land it cannot be too much guarded against, and ought never to be sown with seed corn. Also, it should be sedulously rooted up by weeding in spring; for where it has once got in the land, it propagates itself by scattering many seeds before the crop is ripe. Hence wheat, on land so infested, should always be sown on a naked fallow. It must be understood that these hints are given with a view to

the common husbandry. Whether it be well or ill conducted, is a matter very interesting to the cultivator, and also to the public; but if well conducted, the success and produce may be very satisfactory, although drilling and horse-hoeing be not practised.

4. TARES. (*Ervum tetraspermum*.) Smooth Tare.

About two flowers on a peduncle; seeds globular, four in a legume. Engl. Bot. vol. xvii. t. 1223; Curtis, Lond. vol. i. p. 55.

Ervum hirsutum. Hairy-tine Tare. Peduncles many-flowered; seeds globular, two in a legume. Engl. Bot. vol. xiv. t. 970; Wither. Arr. 781; Curtis, Lond. vol. i. p. 54.

Two species of wild tares, called the *tine tare* and the *strangle tare*. It is said, that on dry soils, in wet seasons, they have overrun and destroyed whole crops of corn. I have seen samples of wheat and barley very much infested with the seeds of tares, but I always took them to be the seeds of the cultivated tares, especially of the winter sort; yet the spring tares may grow amongst barley; and both, in this sense, become injurious weeds. Certainly the seeds which infest these samples exactly resemble in size and colour those of the cultivated sorts. The wild tares are not common, and the seeds of them are much too small to be mistaken in samples for the cultivated sorts. While I was writing this article, I received a call from my esteemed friend

Mr. Sinclair, author of the *Hortus Gramineus Woburnensis*. In comparing notes on the identity of plants, we agreed in desirableness, that, if it were possible, every plant which we have occasion to name should be ocularly and familiarly known to the writer; but this being quite hopeless, accurate practical knowledge of every seed is not to be expected. In works on agriculture there are many errors of this sort, and in some instances these can only be corrected by rational induction.*

The miller's objection to these seeds is, that they have a strong taste when ground in the flower. Hence it seems to become an important consideration, whether field tares should be suffered to go to seed, or rather to be fed off, and ploughed down soon enough to prevent it. Also, for soiling, small patches may be set apart, and seeds, at last, may be raised therefrom. For it seems to be a doubtful advantage in agriculture, that the introduction of tares should overrun our fields with new enemies.

The cultivated tares are very common in samples of wheat and barley in the market of Peterborough in Northamptonshire. Perhaps in other places they may not yet prevail, and the farmers will do well to avoid them by all means. It must be unpardonable neglect to sow them

* The seeds of the above-mentioned tares are *small*: of course any farmer will know whether those which have got into his corn land be the cultivated tare.— *Note by the Editor.*

with seed corn ; but if they come of the general cultivation of the plants, the matter is much more serious.

5. WILD OATS. (*Avena fatua*.) Bearded Wild Oats, or Haver. Panicle erect, compound ; spikelets *pendulous* ; florets about three, shorter than the calyx ; bristly at the base, with an oblique scar, all awned. Sm. Engl. Fl. vol. i. p. 162 ; Engl. Bot. vol. xxxi. t. 2221.

This weed used to abound on stiff clays, in open fields : the fallows were generally abortive, and only brought the land, about Michaelmas time, in moderate condition for this weed to grow and come up with the wheat. Accordingly such abundance of it would come, that at harvest the whole crop would appear to be wild oats. I once knew a farmer, who in thrashing out a stack of wheat, dressed out of it fourteen or fifteen coombs of these oats : this was during the war, and in a great dearth of oats ; and he actually sold them for horse-corn, at about 28s. per quarter. Wild oats are seldom found but on clays and stiff gravels : on all loose soils, on dryish turnip land, on sandy soils, and on fen and marsh land, they are rarely seen. The seed is somewhat larger than common oats, of a dark brown colour, and having a very rough awn or beard. Of course millers may very well object to them ; for when many prevail in a sample of wheat, they occupy a considerable portion of the

measure. It does not appear that in spring these weeds can be sufficiently distinguished from the wheat plants, to be selected and weeded out, which is also the case with darnel, and is the more to be lamented, because the best system can hardly be expected to eradicate those weeds, in regard to which the hoe and the hand cannot be brought in aid of the fallow and row-culture. But this ought to be strictly attended to, as being the strongest argument possible, why these seeds should not be sown with seed corn. So far, the farmers who pay attention are masters of these weeds; and it must be a wilful neglect not to act accordingly.

6. HARIFF. (*Galium aparine*.) This weed has many other names, — Goosetongue, Cleavers, Cliders, Catchweed, Goosegrass, &c., — by one or other of which it is probably known every where. Leaves eight in a whorl, lanceolate, keeled, rough, fringed with reflexed prickles; stem weak; fruit bristly. Sm. Engl. Fl. vol. i. p. 210.* Engl. Bot. vol. xii. t. 816.

It is said that geese are very fond of it; but geese rarely feed in hedges, and this weed grows no where else, except among crops of corn, where geese are not allowed to go. In the fens of Ely

* This common weed has been found wild in the remote country of Nepal, by the Hon. Captain Gardner, from whom Dr. Wallich sent Sir James Edward Smith specimens. See English Flora, vol. i. p. 210. — EDITOR.

and Cambridgeshire, where every farmer keeps geese, and most of them have plenty of this weed, I never heard that the geese were seen to eat it.

Hariff is a very scrambling weed, and runs to the length of seven or eight feet, increasing in weight of branches and foliage as it obtains the light, and gets through whatever it grows with. It is, however, principally addicted to deep, loose soils, mellow, marshy land, and the drier sorts of fen land. All lightish loams may have hariff, but it abhors clay, and fen soils lying damp and low are not friendly to it. In many clay countries it is probably not known, though it be one of the very worst weeds where it abounds. The farmers of clay lands on the verge of the fens, often buy their seed wheat of the fen farmers; and they heed not the seeds of hariff, for, if they grow, they come to no length, and are never seen at harvest.

This weed increases excessively on loose, deep soils, when once introduced; its seeds are round, with a channel on one side, as if rolled up. They are exceedingly rough, and adhere to whatever woollen stuff they touch, so as not to be easily dislodged. They are also heavy enough to resist dressing, and big enough to escape the screen. Botanists tell us that they may be roasted instead of coffee; but unless children gather them out of hedges for this purpose, they cannot be obtained separate from other rubbish.

Without doubt, when roasted, they would grind; but raw they are the toughest of all seeds

in agriculture. Millers may very rationally object to them, for, if they be numerous, they will almost make the stones whistle. In samples of oats they are abominable; horses can scarcely grind them.

How to destroy this weed, is how to destroy all annuals, namely, by encouraging the seeds to vegetate, and killing them with the plough. However, as it chiefly infests dry and deep soils, or black-mould land, it may be useful to the *amateur* to shew by what rotation it may be effectually subdued. Suppose a quantity of this weed to grow with a crop of oats; after harvest, as rains come on, the scattered seeds will very numerously vegetate on the surface; this will be much encouraged by getting off the stubble, and harrowing; when the opportunity occurs, plough the land a shallow tilth, and harrow it again. Much surface rubbish may now be raked and carried off, and the land lie till spring. After spring seeding, plough this piece a seed furrow pitch, and harrow it; clean it from twitch and roots, and let it lie to be green over with annuals. It may then be manured, and the manure immediately ploughed under. After a little harrowing and handpicking the twitch, the land may lie till you choose to sow it; the best crop is *rape* if the land be light, which should be sown rather late (about the beginning of August), and perfectly well hoed and cleaned. The crop may be stocked with sheep in February, but not eaten too close down. The surface, as the spring ad-

vances, is to be kept clean with hoes, and the rape is to stand to be threshed ; after which the surface must be discharged of the stalks by pulling, and the land may be sown with wheat at once ploughing. This crop may be cleaned with a little exertion by weeding ; and in the spring sow the land well down with the best mixture of grass seeds that can be procured.* Though light land does not suit wheat, especially as to quality, yet depth and penetrability of subsoil will generally give you produce enough. It grows too tall and flaggy, and is easily brought down with wind and rain ; but if it be clean it will make good seed for other soils ; and you can by no other means obtain so much profit, *without deteriorating the soil*, by any other rotation of the crops.

This argument might be beneficially extended, as it applies to the cultivation of dry black-mould land, of deep texture, having some dry peat remaining, and a clay bottom, too far below to be ploughed up, except in spots and patches. This land will by no means lie profitably in permanent grass, neither can any four fields of it be rendered convertible, because the continuance of ploughing pulverises the soil to dust, and the encroachment of the couch requires much exer-

* See *Hortus Gramineus Woburnensis*, for a list of the most valuable grasses for the above purpose, as well as for permanent pasture ; to which may be added Dickson's rye-grass, a most valuable variety, introduced to agriculturists by that eminently skilful farmer, Mr. R. Dickson, of Kidbrook.

tion to master it. In the state of a dry powder, the soil powerfully resists moisture, and becomes highly infertile, and the weeds overpower all husbandry.

The usual rotation and the drier part of fen lands, is either from paring or burning the grass surface for rape, eaten off with sheep, to oats the second year, and wheat the third year; or Heligoland beans after rape, and wheat the third year. If with the wheat, the land were returned to grass, no fault ought to be found; but the cultivator will not part with the arable system so soon. After wheat they go to fallow, and here begin the *powder* and the weeds. Fourth year, fallow, rape; oats the fifth year, and then wheat and grass seeds. No management on earth can subdue weeds on light, deep soils with such a system; those which naturally prevail in the soil, and such as may be sown with the crops, are perfectly triumphant. Horse-hoeing is here impracticable, the soil being so light; hand-hoeing and weeding have been followed, to the expense of five or six and twenty shillings an acre, without being able to clean the crop. The mode looked to, is to get a thick crop of corn if possible, and when the crop is a foot high, or more, to put weeders in it, who break off and crop and batter down the biggest of the weeds, and leave the others to contend with the crop as nature and the season may rule. As to hariff, where it abounds, they sometimes drag the crop (if wheat) with a horse-drag. Sometimes the weeders make them-

selves short rakes, and scratch and tear the crop in pieces, as well as the weeds. These methods never did much good; for that which pulls the corn away, opens the path for the weeds to grow again. Where patches of this weed grow through a thick crop of wheat in spring, nothing better can be done than to crop off the superior shoots within the wheat leaves, and leave the wheat crop as entire as possible, to smother the plants below.

But, after a great deal of experience, which I have had in the cultivation of dry-bottomed and deep black-mould lands, I recommend short rotations of cropping between longer intervals of grass lay. Nothing else can subdue the weeds, which are so numerous and ramping in such soils.

7. BLACK BINDWEED. (*Polygonum convolvulus*.) Climbing Buck-wheat. In some places called Bearbind; but in the fens simply Bindweed, because such land produces none of the perennial rooted species hereafter mentioned. Leaves heart-arrow-shaped; stem twining, angular; segments of the calyx bluntly keeled. Sm. Engl. Fl. vol. i. p. 239; Engl. Bot. t. 941.

Annual; flowers in June and September.

This weed is too often a companion to the last: the same soils grow it abundantly where it has got in by sowing, and it runs to as great a length, getting above the corn that is *laid*, and covering the crop by patches.

The seeds are brown, triangular, hard, and

smooth, and quite as nutritious as buck-wheat. They are heavy, and large enough to resist dressing, and in wheat samples are objected to for the same reason as cockle. In oats they are really no objection to the buyer, horses being very fond of them. The farmer, however, has just reason to stand in fear of this weed, from the destruction it brings to his crops, and the injury done to the samples.

8. SHEPHERD'S NEEDLE, VENUS'S COMB, or NEEDLE CHERVIL. (*Sandyr pecten Veneris*.) Called also Beggar's-needle and Crow-needles. Fruit nearly smooth, with a bristly edged beak; umbels simple, solitary, or in pairs; bracteas jagged; petals inflexed at the point. Sm. Engl. Fl. vol. i. p. 47; Engl. Bot. vol. xx. t. 1397.

Annual; June, September.

This is a bushy and troublesome annual in barley crops; the seeds are long and bent, of a rough texture and brown colour. They are seldom seen in samples of wheat, being a little too short of growth; but barley, being mown, must necessarily be infested if they be in the crop, for no dressing can separate them. I was told in Hampshire that *they never weed their barley*: but whether their flinty and calcareous soil be much suited to this weed, I do not know; certainly there were many tall *horse knaps*, and a sprinkling of *thistles*, *docks*, *wild carrots*, and such things, standing bolt upright when the barley drooped with ripening. I doubt very much whether any

more weeding will be done, in consequence of the writing of this Essay: the breadths sown are very large, and I suppose they have not women and children enough in the villages to do what is wanted.

9. ANNUAL SNAKEWEED, (*Polygonum lapathifolium*.) Pale Persicaria. Styles two, distinct; stamens six; flower stalks rough; stipulas beardless; seeds concave on each side. Sm. Eng. Fl. vol. xi. p. 234; Engl. Bot. vol. xx. t. 1382.

Called in the fens willow-weed, where it is one of the worst weeds they have. It grows very freely on all loose and deep soils, and on marshy lands, though it be scarcely known to any of the cultivators of clay, and it is as rarely to be seen on any sort of turnip land; so that the greater part of farmers will not be able to comprehend what plant is meant. Botanists know it very well, but they do not know it to be a destructive weed; accordingly, in Mr. Pitt's Essay it is omitted.

This plant grows from one foot to near three feet high, but commonly from eighteen inches to two feet. Its stalks are pale, or spotted, or reddish, the joints much swollen, and the stalk appearing tender and succulent, (something like that of the balsam). The plant branches much when it has free growth, and produces a great number of crowded spikes of seed. The leaves resemble those of the willow, but are charged with dark spots in the

middle. The seeds are very bright and heavy, round one way, but flat and indented on one side; the colour is black. This plant belongs to the same genus in botany, with buck-wheat and black bind-weed; and its seeds are highly nutritious, and very grateful to birds, especially partridges.

These seeds very much infest samples of fen corn, whether wheat, oats, or barley. The skreen, indeed, discharges much: and, with pardon be it spoken, I have seen sacks filled with it, and shot into a dry ditch. Those who keep decoys for catching wild ducks, will buy the seeds to feed and entice the fowl. Pigs will do well on them, if boiled.

As a weed, in fen soils, it is the most ramping and cumbersome of any weed that grows. Its seeds abound in the soil, and increase by scattering from each crop, so that in many cases, by spring cleaning, the whole surface is covered with the plants; these are usually ploughed down, and the land sown upon the second earth; but often as many more appear, and very much injure the crop. In 1821, a piece of loose, low land, in the newly enclosed fens of Peterborough, was sown with oats and rye-grass; but this weed usurped the soil, and spoiled the crop. The next spring, when the field should have been grass lay, these seeds again rose so thick as to cover the field entirely, excepting a few patches. The land had sheep put upon it to eat what grass there was, and the crop of weeds was left to stand till autumn. During a great deal of the summer, the

sheep could not be easily found in the *cover*: and when mown down, being then dead and ripe, the swarths lay like peas and beans, sending forth a strong and peculiarly bitter smell. This crop might supply the soil with a stock of seeds, at the rate of twelve bushels to the acre.

Of course this was not the way to destroy snake-weed, or willow-weed; but all fen soils contain a great deal of it: when they come again from grass, to be pared and burned, as much as lies to one inch and a half deep will be consumed by the fire. Some will grow (with other weeds) in the rape; oats the second crop, at once ploughing, is generally a thick and quick growing or smothering crop; not many weeds can contend with this crop, and weeders may easily subdue them. In autumn sow wheat on the oat stubble, and in spring sow grass soon enough; roll well, and weed well; and if you have not destroyed much willow-weed, you have done the next best thing, that is—*hindered it from growing*.

10. CHARLOCK.

It scarcely deserves mentioning that these seeds are found in samples of corn at all, because a skreen will separate them completely, they being so minute; they will therefore be more particularly mentioned hereafter. Of these ten weeds, whose seeds infest samples of corn, five are principally injurious to wheat; the others are partial, and more common in barley and oats.

CHAPTER II.

OF FALLOW WEEDS.

THE distinction of fallow weeds is not made as if all surface-rubbish, and the seedlings which grow, were not to be also destroyed by the fallow ; but rooted weeds, and a few others, deserve to be particularised, and treated as objects to which the attention ought to be drawn. After all which has been said about pulverising the soil, that the *seedlings* may vegetate, this has never been the object of any fallow. In clay land, and all stiff loams, every exertion is made to break the soil down as fine as possible ; but the weeds grow incidentally, and according to the season, and must be destroyed *if they grow*. In all light soils, a high state of pulverisation is unavoidable, because while they are working out the couch, the other necessarily takes place. But whether many seedlings shall grow, depends on the moisture of the season, as before. Mr. Pitt says, (very cunningly,) “ I have observed that wet weather is as necessary as dry, to give a summer fallow its whole effect.” Most farmers may have observed the same thing, though they cannot alter the weather ; but in waiting and wishing for rains, when they are scarce, all hard land farmers look

more to the pulverisation of their fallows than to the vegetation of their annual weeds. The only observation of any practical importance is, that *clay fields for fallow ought, if possible, to be autumn-ploughed*; because in spring you may be obstructed by drought, and be inabled from attaining the necessary pulverisation. Couch is very hard to kill in clay; it will scarcely ever draw; and in breaking down the soil, every division of a clod into two parts often leaves a piece of couch running through the middle of each. In wet seasons no good can be done; and as far as regards the real objects of fallowing, dry weather on the whole is the more favourable. In every able fallow, a great many annuals are destroyed of course; but in those which are less complete, whether it be from the farmer's inattention or want of power, or from the interruptions of too much wet, much worse things are left behind than the seeds in the soil. In point of fact, there can hardly ever be above *one extra ploughing to turn down seedlings*, on any soil, and in the most favourable season.

Modern writers have treated this subject as if *pulverising* were a new object in fallowing; or as if the seedlings of weeds did not always grow with pulverisation; or thirdly, as if all the seeds of annuals which the soil contains might be easily destroyed, by due attention to this object. In truth, it is no such thing; for some years these extra exertions (if extra pulverisation be effected) would fill the *crops* with a more abundant growth:

if these be all killed by the hoe and the hand, and clean husbandry be accomplished, and so continued, the number of seeds must diminish, and the labour would at length be mitigated. Nevertheless, this is wholly impracticable on poor soils, where weeds most abound, because the crops will not pay the expense; and on obstinate clay soils it is equally impracticable, because the drill system cannot be efficiently worked thereon.

The objects of a fallow are, and always were, 1st, To eradicate root weeds, and cleanse and open the soil to the fibres of future crops. 2d, To pulverise and break down the texture of clay soils, and mix them with manure, in order to bring the land periodically into a mild and fertile condition. The convertible, or turnip system, introduces no new object in fallowing; the soils being lighter, the business is accomplished in shorter time; therefore turnips are sown with the manure, and the land has thus a double advantage in the renewal of its fertility; at the same time returning a valuable crop for the expenses incurred. Seedling weeds are destroyed incidentally; and good fallows, with good seasons, kill a great many, though it be not the object of fallowing.

The fallow weeds are principally such as follow:—1. Couch; 2. Rest-harrow; 3. Saw-wort (the common Way-thistle); 4. Curled Dock; 5. Tall oat-like Soft-grass; 6. Colt's-foot; 7. Corn-bindweed; 8. Corn-mint; 9. Surface-twitch;

10. Black-grass. Many others might be added ; but if these be subdued, the others must be killed of course.

1. COUCH. (*Triticum repens*.) Calyx valves pointed or awned, lanceolate, many ribbed ; florets about five, sharp-pointed, or awned ; leaves flat ; root creeping. Smith, Engl. Fl. vol. i. p. 182 ; Hort. Gram. Wob. fol. ed. 307 ; 2d ed. p. 402.

Until of late years, that botanical science has afforded us better information, it was generally supposed that all couch or twitch was of one sort, or the roots of one species of grass. But many persons observed that some of these roots, on wet soils, were *black*, and much smaller, and they had locally obtained the name of *black twitch*. Queries have also been sent to the Farmer's Journal, "What is black twitch?" In fact, the black twitch, on soils where it prevails, is much worse than the other, because it is wiry and small, and not so easily discharged from the soil ; it is also more brittle, and by harrowing breaks short. It is called

Agrostis repens. Panicle scattered ; branches bare at the base ; florets few ; calyx inner valve smooth ; root creeping. Hort. Gram. Wob. fol. 231 ; 2d ed. p. 344.

There are two other grasses which have strong creeping roots, and are indifferently called couch ; these are the *Holcus mollis* and the *Poa pratensis* : they may locally abound, but, as far as my know-

ledge goes, they are not so common as the *Triticum repens*.

Holcus mollis. Creeping-rooted Soft-grass.

Calyx partly naked ; lower floret perfect, awnless ; upper with a sharply bent prominent awn ; leaves slightly downy ; root creeping ; flowers in June and July. Sm. Engl. vol. i. p. 108 ; Hort. Gram. Wob. fol. 43 ; 2d ed. p. 166.

Poa pratensis. Smooth-stalked Meadow-grass.

Panicle spreading ; spikelets four-flowered ; florets lanceolate, five ribbed, connected by a web ; stipula short and obtuse ; stem and leaves smooth ; root creeping. Sm. Engl. Fl. vol. i. p. 125 ; Hort. Gram. Wob. fol. 17 ; 2d ed. p. 144.

With respect to destroying couch there can be but one way ; that is, by ploughing up the soil and pulverising it.

If there were no fallow weed but couch, as far as British husbandry is concerned, fallowing would be quite as necessary, and much the same in operation, as it is at present. Under every rotation of crops, with the best management possible, couch accumulates in all soils. The very best fallow must leave some ; with the barley it kindles and shoots, and the clover year fosters its growth. If then you have wheat at one ploughing, it is seldom wise to break up the tilth, but rather to harrow it lightly down, and drill the seed upon the unbroken furrows ; surface hoeing destroys annuals, but has nothing to do with

eradicating twitch. Hence, after the wheat the fallow becomes as necessary as before; and this must be always so. On clay soils, according to their quality, whatever the rotation be, fallows are still more necessary, because of their cohesive nature. Twitch does not work so freely on stiff land, nor does it accumulate so much; but here the labour, which might be slighted if destroying couch only was considered, is necessary to pulverise the soil, as an indispensable principle of fertility.

By our ancient system of fallowing open-field lands, it does not appear that destroying weeds was much in their thoughts; nor had the great benefit of pulverisation on clays attracted their attention. They broke up their fallows in May and June, sometimes so hardened, and in such immense lumps, that the rest of the summer did not dissolve the clods; nor, with the assistance of their abortive operations, was the soil half broken down as it ought. Nevertheless, their sole objects appeared to be, to break down the soil, and mix it with manure in preparation for sowing their wheat. At any rate, as the breaking down was frequently incomplete, the *cleansing* must have been abortive, if they had it in view.

The modern dispute about the utility of fallowing, or, in other words, the whole argument of the anti-fallowists, is founded on this point:—that perfect and sufficient pulverisation on heavy soils would enable such soils to produce a root crop with the fallow (as potatoes), and the land would

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go to wheat in a better state than without such crop. This argument is true, as far as heavy soils are rich. A great deal of such land, very ill-managed before, by more expense and exertion has proved the fact; but this is the same thing as saying that such lands were capable of a better and more profitable rotation. The rule does not extend to cold clays, and especially not to such as are spewy; so that the anti-fallowists have proved nothing, and fallowing remains an indispensable part of husbandry, and will for ever.

2. REST-HARROW. (*Ononis arvensis*.) Called also Cammock. Flowers axillary, in pairs; leaves ternate, upper ones solitary; branches villose. Engl. Bot. vol. x. t. 682; Wither. Arr.

I should not have set this down as a fallow weed, had not Mr. William Pitt, of Wolverhampton, mentioned, in his Essay on Weeds, (printed in the 5th vol. of Communications to the Board of Agriculture,) that it is common about Wolverhampton. He adds, "But if the root can be destroyed in the fallow, there is little danger from the seeds." Though Mr. Pitt, by several of his articles, was not an agriculturist, yet he understood botany very well, and must be allowed to know what was *common about Wolverhampton*. There can be no doubt but that the rest-harrow and the thorny rest-harrow (*Ononis spinosa*), were common annoyances to the operations of agriculture a hundred years ago, but I should have

thought them now confined to wastes, banks, and warrens. The names *petty whin* and *ground furze*, given to the thorny species, will indicate to the reader its resemblance to gorse (*ulex Europæus*); but the flower is nearly white, and the plant trails on the surface. It is quoted by Dr. Withering, from Mr. Woodward, "That he examined some hundreds of plants of the *arvensis*, in the corn fields at Berkhamsted, in Hertfordshire." The plant of course is shrubby and perennial, but it deserves to be closely examined into, why it is that the roots are not destroyed by fallowing? Is it owing to the great depth to which they penetrate, or to their fibrous minuteness, like nettles? Also it seems to require consideration, that in a very great number of fields it has certainly been destroyed; and why, therefore, it should yet be common in others?

3. SAW-WORT. (*Carduus arvensis*. Sm. Fl. Brit. *Serratula arvensis*. Linn.) Leaves sessile, pinatifid, spiny; stem paniced; calyxes ovate, spinulose. Engl. Bot. t, 975; Wither. Arr.

The common way-thistle, or pasture-thistle; but also a very bad perennial weed on rather light loams, and loose, strong soils. Indeed, it grows almost every where, and loves mellow clay, and seemingly wet clay quite as well; but it is more easily subdued on good strong loams than on such soils as are either very loose or very wet. It seems quite impossible wholly to destroy this weed by any exertions of tillage which are consistent with

due attention to profit. We can do no better in any case than give a good naked fallow ; after which a good many of these weeds may rise the next year with the wheat ; for that season they should be carefully *handwed* if the soil be open : if it be clay they will not *draw*, but must be cut close with a spade. If neglected, there is no weed more unsightly or injurious ; the second growth, on loose soils, often gets into the reapers' hands ; but the first, if not destroyed, will overtop the wheat, bearing innumerable clusters of flowers, and shedding their winged seeds in most noxious abundance.

The roots of this weed are sometimes called *vermicular*, but whether this is because they creep invisibly, and spread in an unaccountable manner, is not mentioned. We have generally understood *vermicular roots* to mean those creeping roots which are very crooked, and lie much curled together, as in the great hedge-bindweed (*Convolvulus sepium*). I have observed the roots of the thistle to be often curled up, but it has always been in a dry crack in the clay where they could not get out. I believe the roots of thistles, the living roots, can seldom be seen or found, much less picked out, in a fallow. If they have horizontal roots, they lie deeper than we can plough : and, indeed, something of this sort might be suspected, because the spring and summer plants, especially on loose soils, often draw with a tap root (an annual root) a foot long, or more, still leaving part behind. However, this root or

descending caudex may strike down, from midway or higher, in the cultivated soil, as the *ascending* caudex or stem rises. I have found on light rich soils, in spring, a great many small thistles, as it were, bursting from their matrix, and have gently pulled the horizontal zigzag roots from the soil, with many green buds and shoots just appearing. These roots were jointed, white, and of a very succulent texture. This, therefore, is the manner of their reproduction: the fibres left, shoot out larger roots, which also rise higher in the soil, and spread; these form buds, and hence come our annual crop of thistles.

Now, what is the reference from the facts, that couch-grass and thistles can by no means be extirpated? Is it not perpetual exertions, fallowing, and agricultural labour? Some may be inclined to say, "A melancholy reflection!"—But I say *no*—not at all. Providence could not have better contrived than that exertions should be perpetual, and that *success* should be in proportion. There is not a weed that we ought to wish out of our fields, unless we remove and destroy it; because, if there were none, or very few, all fields would be clean, and no praise could light on superior modes of tillage. Some may say again, "So much the better!"—But I say *no*:—Does any man think that our various soils would have been sufficiently pulverised and worked, had there been no enemies of this sort to challenge forth our labour? Sterility would have seized on our turnip lands, which are only continued in a state to bear their

relations of crops, by the necessary periodical renewals of their fertility. So might all our clays have gone to perpetual grass, for neglect of proper tillage would have rendered them unprofitable. "By the sweat of thy brow thou shalt eat bread," is an ordination of the highest authority, and the fulfilment of it is that precise principle which puts all mankind in motion. The necessity of subsistence produces industrious hands for every department of labour; but the sluggish nature of man requires every stimulus to exertion. The weeds of the fields excite emulation among farmers, and foul fields are always a reproach to the occupier. Thus we are compelled, by an unseen hand, to better habits and more active industry.

4. CURLED DOCK. (*Rumex crispus*.) The Common Dock of clover fields. Petals permanent, ovate, entire, all tuberculated; leaves lanceolate, wavy, acute. Root, perennial; flowers in June and July. Sm. Engl. Fl. vol. i. p. 191; Engl. Bot. vol. xxviii. t. 1998.

To avoid this pest, farmers should be cautious not to sow clover seeds which have the seeds of the dock intermixed. The seeds are triangular, bright brown, and heavy; and so near the size of red clover seed, that they cannot be separated by sieves. In some seasons we get good ripe seed from clover eddishes, and this is always free from docks, because these weeds do not form a second seed-stem in the same summer; but I am afraid that

maiden seed (seed from the first growing) is rarely quite free. But this really seems to be a point of inexcusable neglect, because the dock plants are sufficiently large and conspicuous to be either drawn or spudded, before the clover is too high to walk in.

Dock seeds do not infest corn samples; it rarely happens that they are seen even in barley, because the turnip fallow is quite capable of rooting them out. If otherwise, and they are suffered to seed in the barley crop, it must be very bad farming, because no weed can be more distinctly seen when weeds ought to be pulled out.

5. TALL OAT-LIKE SOFT GRASS. (*Holcus avenaceus*,) or Tall Oat-grass, (*Avena elatior*.) Calyx smooth; barren floret lowest, with a sharply-bent prominent awn; fertile, one slightly elevated, scarcely awned; leaves rather harsh; root knotty; flowers in June and July. Sm. Engl. Fl. vol. i. p. 108; Hort. Gram. Wob. Fol. 49, 2d Ed. p. 169.

This grass is a noxious weed in arable lands, though not so in pastures; indeed, as an ingredient of permanent pasture, it possesses sufficient merit, in respect of early growth and produce, to entitle it to a place in the most valuable pastures—such, however, as are never intended to be converted to tillage. Mr. Pitt includes this among the *Twitch grasses*, but its roots do not creep in like manner; they are properly *bulbous*, and, increasing in the soil, they are hard to destroy.

These bulbs often subsist in great quantity where there may be but little *couch*, but at least as much fallowing is required to remove them. In fact, as the bulbs may not all hang to the congeries of fibres to which they belong, many loose ones, though ever so lightly covered with soil, will escape; it being manifest, that such small things cannot be picked out, excepting as they hang to something.

This weed has been found very prevalent in some parts of the North of England; but wherever it prevails, it ought to be carefully rooted out, for the plant it bears is tall, strong, and cumbersome, capable of contending with any crop, and often grows taller than the corn. Besides, it has a tendency to take absolute possession of the soil; and, if once in possession, it is most difficult to eradicate. In wet, clayey, arable soils, where, through neglect, this weed abounds, the only remedy is paring and burning the surface of the land, and afterwards giving it a naked fallow. The row culture, and liberal use of the horse-hoe, being adopted in every succeeding crop, will effect the destruction of the weed, and prevent its regaining a general footing in the soil.*

* There is a variety of this grass without awns described in the Hortus Gramineus Woburnensis; it is also destitute of the bulbous roots which constitute the character of *couch*, as regards this grass. It is probable that there are two varieties of the awned sort, one with the bulbous roots as above, and the other with scarcely any bulbs. Provost Dods, of Haddington, who has paid great attention to the subject, informs me, that in some soils in East Lothian the bulbous-rooted oat-grass is one of their most troublesome weeds.—EDITOR.

6. COLT'S-FOOT. (*Tussilago farfara*.) Scape 1-flowered, scaly; leaves cordate, angular, toothletted. Engl. Bot. t. 429.

The roots of colt's-foot creep horizontally far and wide. Every part of the root will produce a plant, and, though buried to the depth of a yard or more, it will vegetate, send up a stem to the surface, and spread out with astonishing rapidity. It will flourish in the strongest clays, in which it is found to be one of the most injurious of weeds, and hard to destroy. Where it abounds, draining should be had recourse to, if the soil be damp; and if clayey, the texture of the soil should be improved by an abundant application of sand, coal ashes, or other warm dividing manures. Paring and burning early in the spring, and followed by a naked summer fallow, will overcome this weed so often complained of by farmers; and the adoption and judicious application of the row, or drill culture and horse-hoe husbandry, will complete the eradication of this vile and troublesome weed. I have completely overcome colt's-foot, by simply draining and hoeing. It was never suffered to produce flowers, or fully to expand the leaves; this plan persevered in, and faithfully executed throughout one entire season, was found sufficient to subdue it. But when suffered to flower, and to expand the leaves, the increase of the creeping roots went on in proportion, and rendered simple hoeing afterwards for that season of little use. The roots are frequently found deep in the soil, and when it gets established in clayey or marly lands, it is next to

impracticable to get rid of it. By deep ploughing and forking out, a great expense is incurred ; and, as before observed, should the smallest portions of the roots be left in the soil, plants will be produced from them, and the previous operations of ploughing and forking out will be found to have prepared the soil for the more rapid propagation and extension of these plants. However, if the colt's-foot can be ploughed and forked out at a reasonable expense, it will assist more effectually the practice, recommended above, of destroying the plants, by never suffering them to flower or to develope their leaves, which may be effected by the hoe when the land is under an annual crop, provided the row culture be adopted.

CORN BINDWEED, SMALL BINDWEED.

(*Convolvulus arvensis*.) Leaves arrow-shaped, acute at each end ; stalks mostly single-flowered ; bractees minute, remote from the flower. Sm. Engl. Fl. vol. i. p. 284 ; Engl. Bot. t. 312. Root perennial ; flowers in June and July.

The root penetrates to a considerable depth in the soil, and creeps powerfully. Light sandy soils are most subject to it. Corn bindweed is as difficult to extirpate as colt's-foot ; and when it once gets introduced into the soil, whether in grass or in tillage land, it is found to be unconquerable by the ordinary modes of weeding. The stems entwine round and choke the plants of corn, pulse, or grass. Every portion of a broken or divided root will grow and produce a plant ; it

vegetates rapidly, and spreads in every direction. By never allowing the young shoots to develop the leaves, but by hoeing on their first appearance above ground, in the course of one season the roots will be found so much exhausted, as to yield afterwards to the drill culture of crops, provided the principle be acted on of using the hoe, so as to prevent the shoots of the plants from expanding their leaves. The mode recommended for the speedy and effectual destruction of colts-foot equally applies to corn bindweed. Paring and burning the surface, however, recommended in the former case, will not be advisable here, as the light sandy nature of the soil in which bindweed prevails would suffer injury in its texture from the process. But a naked summer fallow, with due attention to deep ploughing, and careful forking out of the roots of the weed, are essential to begin with, and the row culture and persevering use of the hoe ever afterwards followed.

1. WILD CARROT. (*Daucus carota*.) Bristles of the seeds slender; leaflets pinnatifid, with linear-lanceolate acute segments; umbels with a solitary, coloured, abortive flower; when in seed concave. Sm. Engl. Fl. vol. ii. pp. 38, 39; Engl. Bot. t. 1174. Root biennial; flowering in June and July.
2. HEDGE PARSLEY. (*Torilis infesta*, Sm. Engl. Fl. vol. ii. p. 43; *Caucalis infestä*, Engl. Bot. t. 1314); sometimes called

Dill. Umbels of many close rays ; general bracteas scarcely any ; leaflets pinnatifid ; branches spreading. Sm. Engl. Fl. vol. ii. p. 43. The seeds are destitute of ribs ; covered irregularly with ascending, awl-shaped, shortish, rigid prickles, or partly with blunt, prominent, crowded granulations ; the *junction* channelled, close, *ibid.*

3. COMMON FOOL'S PARSLEY. Lesser Hemlock. (*Æthusa cynapium*.) Leaves uniform ; leaflets wedge-shaped, decurrent, with lanceolate segments. Sm. Engl. Fl. vol. ii. p. 64. Root annual ; flowering in July and August.

The seeds are ovate, moderately convex, with 5-tined, rounded, acutely-keeled ribs, and deep acutangular interstices ; their inner surfaces dilated, flat-marked, marked with a pair of coloured longitudinal lines, and closely pressed together, *ibid.*

4. SPINGEL or FENNEL. (*Meum fœniculum*, Sm. Engl. Fl. vol. ii. p. 85 ; *Anethum fœniculum*, Engl. Bot. t. 1208), or Common Fennel. Leaves triply pinnate ; leaflets awl-shaped, drooping ; bracteas none. Sm. Engl. Fl. vol. ii. p. 85. Root biennial ; flowering in July and August.

The names wild carrot and dill are often applied by husbandmen to the above four plants generally ; the third, or fool's parsley, is considered

dangerous, or possessing poisonous properties. As weeds, they are not of a very troublesome nature. Some of the seeds, together with that of the common dock, not unfrequently infest samples of red clover: those who please, as they walk in their fields, may examine the seeds of the wild carrot, by rubbing them in their hand, to ascertain whether they be egg-shaped, equal at both ends, quite plump, and rough on the surface, but not so as to adhere to any thing.

When our forefathers had clover seed to sell, they sometimes used to recommend it by saying, "that it had neither dock nor dill in it." The seeds of these plants being sown upon the barley, or being in the soil, escape the weeding of that year, and the next they become strong-rooted plants in the clover, and should be as carefully rooted out as the docks. They are local weeds, and but seldom more than one species is found to infest particular soils; on dry chalky soils the last is (as far as my experience goes) peculiar; the fool's parsley is more common on light cultivated soils.

CORN MINT. (*Mentha arvensis*.) Leaves ovate, acute serrated; stamens as long as the blossoms. Engl. Bot. t. 2119. Root perennial.

Where the land is moist this weed chiefly prevails: its creeping roots are said to be difficult to extirpate; I have not, however, from personal experience, had to contend with it. It is certainly

not a very common or general tillage weed, except on marshy or fenny land, which has been over-cropped; the roots are white, fleshy, and creeping, and bind the soil much in which they grow, obstructing the pulverisation; also many of the roots are cut by the plough, and may break from the tops in harrowing, so that patches (for they generally abound in little hollows) ought to receive extra tillage, by turning short with your ploughs and harrows, and so give more exposure. It is said to be overcome and got rid of by correcting the defects of such soils as encourage its growth, by draining, paring, and burning the surface, and adopting the drill and horse-hoe husbandry. This plant is common enough.

SURFACE TWITCH. (*Agrostis stolonifera angustifolia*.) Smaller-leaved Creeping-bent, or Spurious Fiorin, Red Robin, &c. Panicle crowded with florets at the base and towards the top; florets small; inner valve of the calyx smooth, outer serrulated, corolla without any rudiment of an awn. Hort. Gram. Wob. Fol. 2d Ed. p. 346. Perennial; flowers in July and August.

COMMON KNOT-GRASS. (*Polygonum aviculare*.) Flowers axillary; leaves elliptic-lanceolate, rough edged; ribs of the stipulas distant; stem procumbent, herbaceous; annual flowers from April to

October. Sm. Engl. Fl. vol. i. p. 238 ;
Engl. Bot. vol. xviii. t. 1252.

The root is fibrous, long, very tough, and somewhat woody ; branched below ; stems many, spreading in every direction, generally prostrate, much branched, round striated, leafy, with numerous knots or joints. This and the preceding are indifferently called surface twitch, or red robin, by farmers ; on examination, one will be found a species of the natural grasses, and the latter a species of buck-wheat. They are mischievous weeds among broad cast sown corn and turnip crops, particularly in the early stages of the growth of such crops. How to destroy these, is merely to adopt the drill and row mode of culture, to keep the land fertile by judicious manuring and cropping. Poverty of soil and neglect of the hoe, or its imperfect use in the broad cast-sowing mode of culture, are the great encouragers of surface twitch.

BLACK-GRASS. (*Alopecurus agrestis*), also called Black-bent, Spear-grass, Slender Foxtail-grass, &c. Culm erect, roughish ; spike racemose, nearly simple, tapering ; calyx glumes almost naked, combined at the base, dilated at the keel. Sm. Engl. Fl. vol. i. p. 180. Annual ; flowers from July till November. This annual and noxious species of foxtail-grass is distinguished at first sight from the valuable permanent pasture species, meadow-foxtail (*Alopecurus pratensis*), by the want of woolly hairs

on the spike, so conspicuous in that of the *A. pratensis*. Hort. Gram. Wob. 2d Ed. pp. 283, 284.

This weed produces an abundance of seed, which attracts the smaller birds, as well as pheasants and partridges, which are fond of the seeds. It is execrated by farmers under the names of black-bent, black-grass, spear-grass, &c. It is most prevalent in poor soils, or rather such as are reduced to poverty by hard injudicious cropping. Although an annual, yet it is most difficult to extirpate, for it sends up flowering stalks during the summer and autumn; cutting it down, therefore, previous to the time of its flowering, or of ripening the seed,—an effectual remedy for most annual weeds,—is not of avail with this. It can bear to be repeatedly cut down in one season, without suffering essentially by the process.

“To return land, in this state, to grass, in the hope of overcoming black-grass, will be found an useless and vain labour, for the weed will reappear with the scanty herbage in greater abundance than before. The soil must first be got into *good heart* by very moderate and judicious cropping, which includes the proper application of manure, a skilful rotation of crops, and the most pointed attention to the destruction of weeds, which last can only be effected completely by adopting the drill or row culture for the crops. After this the land may be returned to grass for several years, with every prospect of success.” Hort. Gram. Wob. pp. 284, 285.

CHAPTER III.

OF THE WEEDS WHICH ARE PRINCIPALLY OBJECTIONABLE AS THEY ENCUMBER THE SOIL, OR WHOSE ROOTS ARE ANNUAL, AND WHOSE SEEDS PASS THE CORN SIEVE.

OF this class of weeds, the following deserve particular notice:—1. Charlock; 2. Corn-poppy; 3. Blue-bottle; 4. Mayweed, or Mather; 5. Corn-marigold.

1. CHARLOCK.

This weed was before alluded to, when speaking of those weeds which infest samples of corn, but as the seed is sufficiently small to pass through the corn sieve, its presence in samples must be owing to careless winnowing. There are four different species of plants confounded under the name of charlock, viz. *Sinapis arvensis*, or common wild-mustard; *Sinapis nigra*, black or Durham mustard; *Raphanus raphanistrum*, wild radish; *Brassica napus*, wild navew: this last is the least common.

Sinapis arvensis has pods with many angles, swollen and bunched out of the seeds, smooth, longer than the two-edged beak. Engl. Bot. t. 1748; Wither. Arr. vol. iii. p. 582. It is also called Chadlock, Wild

Mustard, Corn-cale. Blossom yellow, and without veins. Root annual; flowering in May.

Sinapis nigra. Pods rough, laid flat on the spike stalk. Wither. Arr. vol. iii. p. 583. Blossom pale yellow; pods slightly hairy. Root annual; flowering in June.

Raphanus raphanistrum. Calyx upright, close; pods round, jointed, smooth, of one or two cells. Wither. Arr. vol. iii. p. 584. Blossom varying in colour from yellow to straw and white, striped with purple veins. Root annual; flowering in June and July.

Brassica napus, has the root a regular continuation of the stem. Wither. Arr. vol. iii. p. 580. Blossom yellow; pod with warty excrescences. Root biennial; flowering in May.

2. CORN POPPY. (*Papaver rhæus*.) Indifferently called Red-poppy, Corn-rose, Cop-rose, Head-wark, Red-weed, Red-mailkes. Capsules oblong, smooth; stem many-flowered; fruit-stalks with bristles laid to; leaves wing-cleft, smpt. Engl. Bot. 644. Root annual; flowering in May.

3. BLUE BOTTLE. (*Centaurea cyanus*.) Also named Knap-weed, Corn-flower, Hurt-sickle. Calyx with serrated scales; leaves strap-shaped, very entire; the lower ones

toothed. Engl. Bot. t. 277. Root annual ;
flowering in June and July.

4. MAYWEED, or MATHER, or STINKING
CAMOMILE. (*Anthemis cotula*.) Re-
ceptacles conical ; chaff bristle-shaped ;
seeds naked. Wither. Arr. vol. iii. p. 722 ;
Engl. Bot. vol. xxv. t. 1772.

5. CORN MARIGOLD. (*Chrysanthemum sege-
tum*.) In Scotland, this is called Yellow
Gowans, Quills, Gools ; in Kent, Yellow
Bottle ; in Norfolk, Buddle ; midland
counties, Golds, Goulds, Gowls ; north
of England, Gowlans, Goldens, Gules.
Leaves embracing the stem, jagged up-
wards, tooth-serrated towards the base.
Engl. Bot. t. 540. Root annual ; flowering
from June to October.

Linnaeus says, this weed was imported into
Sweden, along with corn from Jutland, about the
end of the last century, and that there is a law in
Denmark to oblige the farmers to extirpate it.
He recommends the land to be manured in
autumn, summer-fallowed, and harrowed in
about five days after sowing:—(Martyn.)

The above class of weeds, with their gaudy
colours, like heralds of spring and summer, pro-
claim bad farming to the landlord, the tenant,
and to the passenger ; and announce the neglect
of using clean seed-corn, judicious manuring,
fallowing, the raw culture, and horse-hoe hus-
bandry.

It is true, however, that certain constituted soils are more obnoxious to particular kinds of weeds than to others; and, *vice versa*, also that the same proportion of labour, skill, and attention, which, when employed, shall keep clean and in good heart one kind of soil, shall not be found adequate to produce the same effects of clean and perfect husbandry on another soil differently constituted, but that increased precaution and industry are required to produce the same effects. Precaution here is of great importance, for if the seed-corn be not clean, the crop will be foul, whatever care may have been employed on the land; on the other hand, should the land itself be clean, and the seed-corn likewise, yet, if the hedge-rows are neglected, and suffered to harbour these weeds, the evil will be found only lessened in a degree, not removed.

To extirpate these weeds, therefore, clean corn-seed must be used, not a single plant of these weeds suffered to perfect seed in the hedge-rows, and a judicious rotation of crops adopted, so as to admit of the unsparing use of the horse-hoe, as well as of the hand in weeding; by which means, these noxious and disgraceful pests of corn-fields will be overcome, and banished from the soil.

The corn-poppy particularly accumulates upon gravelly soils of low quality, also on dry sandy soils, and generally on all dry and shallow lands which are over-cropped and neglected. But much better soils, as loamy, gravel, &c. are infested with it, only here the crops are generally good enough to keep it under; and being less abundant,

it is much easier subdued by weeding. But the corn-poppy is never so triumphant as in a hot and dry season, in which case, many fields, which should have been corn, are wholly covered with it. The misfortune, and that which is borne with wonderful patience by old-fashioned farmers, is, that such a prodigious increase of seeds is added to the soil with every crop. It seems astonishing that the farmers do not think it time now to begin to destroy, rather than propagate them. But they probably reflect that the land is as full of seeds as it can be, or that a bigger crop of the weeds than they frequently get, can by no means grow. This may be very likely, but it is not the way to any remedy or improvement on soils so infested.

One of three things must be done by way of remedy: 1st, the soil must be clayed or marled; 2d, or it must be fed with much larger quantities of farm-yard dung or compost; 3d, if neither of these be easily practicable, *the rotation must be changed*. I have known a farmer, who occupied a gravelly loam quite good enough with good management to bear the *four-course shift*—to pop in a stolen crop of barley between his wheat and the next turnips: nothing can excuse this conduct, as it must necessarily encourage weeds, and hurt the other crops. But the change of rotations must extend to greater alterations than such as this. It is totally useless to continue a course which will not pay the expenses; and therefore, instead of saying, “Fallow your land better; hoe your turnips clean (if you get any);

drill your barley, and leave not a weed in it;" though all these are highly important where the soil will pay you for the working, yet where it will not, after the above course once over, sow good grass-seeds, or sainfoin, to lie for a period of years. This will narrow your ploughed land, and strengthen you in manure; so that improvement may be looked for on the rest of the farm.

When such land comes up again, it must be autumn ploughed, and go to turnips; then barley and seeds again for two years; when it comes up again, autumn ploughed, it will probably bear pease (well cleaned), then turnips, barley, and seeds two years; and soon, if any one pleases to ask, "Where must we grow wheat?" it may be answered, that probably some pieces on the same farm may bear a better rotation; but at any rate, land of the nature above described can but very rarely be fit for such a crop.

When the four-course shift became general, it seemed difficult to think of any other mode, after clover, but wheat; almost all newly enclosed lands, which had been for ages in open fields, would bear clover at first, and generally good, they therefore sowed wheat after, and got pretty crops; but this would not last; and thus the four-course shift has been much too general, and much too long persisted in, on such light soils.

Land of too low a quality for wheat after one year's seeds, is but poor land; but the breadth of it is very considerable in the kingdom. After laying two years in seeds, some try a naked fallow

for wheat; but all their manure is wanted for turnips, and these wheat crops are generally very thin and short. Mr. Coke, of Holkham, after two years' lay, autumn ploughs, and gets the tilth ready for peas, drilled at 18 inches; after the peas, he drills wheat with *rape cake*, and gets (or did get) good crops. But I should think that this system is now at an end; the present art of farming is to do all that the soil will allow—but spare the pocket.

CHAPTER IV.

OF THE WEEDS CALLED UNDERLINGS, OR SUCH
AS NEVER RISE IN THE CROP, NOR COME
INTO THE SICKLE: WITH OBSERVATIONS ON
PASTURE WEEDS.

1. GROUNDSEL, SIMSON. (*Senecio vulgaris*.)

Leaves winged-indentcd, embracing the
stem; flowers scattered. Engl. Bot. 747.
Root annual; flowering from March to
December.

2. ANNUAL MEADOW-GRASS. SUFFOLK-

GRASS. (*Poa annua*.) Panicle divaricate;
spikelets ovate, five-flowered; florets
somewhat remote, five-ribbed, without a
web; culms oblique, compressed. Sm.
Engl. Fl. i. p. 127; Hort. Gram. Wob.
2d Ed. p. 400.

3. CHICKWEED, (*Stellaria media*), or Common

Stitch-wort. Leaves ovate; stems pro-
cumbent, with a hairy alternate line on one
side; stamens from five to ten. Sm.
Engl. Fl. vol. i. p. 537; Engl. Bot.
Root annual; flowering from March to
December.

4. SHEPHERD'S PURSE. (*Thlapsi bursa*

pastoris.) Pouches compressed, triangu-
larly inversely heart-shaped, smooth, with-

out a border; root-leaves wing-cleft. Engl. Bot. t. 1485. Root annual; flowering from March to September.

5. SPURRY. (*Spergula arvensis*.)* Leaves whorled; stalks when in fruit reflexed.

* There is a larger growing variety of common spurry, called *Spergula sativa*, which is cultivated in some parts of Germany for sheep, but chiefly for reclaiming waste, barren sands. Mr. James Booth, of the Flotech Nurseries, Hamburgh, informs me, that its effects in this last respect are found to be highly beneficial. This may probably be accounted for as follows:—the plant is an annual of rapid growth, and derives its chief nutriment from the air; it is consequently very succulent, affording but little vegetable fibre in proportion to its contained juices. It will grow on sands, where scarcely any other plant will vegetate. Its growth is so quick, as to afford two or three crops in the season. Sheep are stated to be fond of it. When the plants are full grown, which will sometimes happen in four or five weeks from the time of sowing, particularly if sown after the warm weather commences, the plants may be ploughed in, and another crop of seed sown; when the plants are again full grown, let the process be repeated. But should the sand produce the plants sufficiently large to afford a regular bite to sheep, then depasturing will be found most beneficial. In this last case, the sand must be ploughed after the sheep have eaten down the spurry; and by fresh crops, depasturing, and ploughing in, the soil will soon be so far improved, as to carry the permanent grasses adapted for light soils. The sand will then bear permanent depasturing; it will be consolidated by the feet of the sheep, and this, with the manure supplied by the sheep, will by degrees perfect a sheep-down. In order that the proprietors, in this country, of the above description of waste sands, might have an opportunity of trying the effects of the *Spergula sativa*, as above mentioned, a supply of the seed from Germany was obtained, and may now be had of Messrs. Cormack, Son, and Sinclair, Nurserymen, New Cross, near London.—EDITOR.

Sm. Engl. Fl. vol. i. p. 336; Engl. Bot. vol. xxii. t. 1535. Root annual; flowering in June and July.

6. CAMOMILE FEVERFEW: (*Matricaria Chamomilla*.) Receptacles conical; rays expanding; calyx scales equal at the edge. Wither. Arr. vol. iii. p. 720; Engl. Bot. t. 1232. Root annual; flowering from May till August.

7. FAT HEN, LAMB'S QUARTERS, WILD SPINACH, MOUNTAIN SPINACH. (*Atriplex hastata*, Wither. Arr. vol. ii. p. 270. *Chenopodium album*, Sm. Engl. Fl. vol. ii. p. 13.) Leaves rhomboid-ovate, jagged, mealy, entire towards the base, upper ones oblong-entire; seed quite smooth. To which might be added May-weed; but as it frequently rises into the sickle, it has been entered under the head of Rampant Weeds.

8. COMMON CORN SALAD, or LAMB'S LETTUCE. (*Fedia olitoria*, Sm. Engl. Fl. *Valeriana olitoria*, Willd. vol. v. p. 102. *Valeriana locusta*, Linn.; Fl. Brit. 39; Engl. Bot. vol. xii. t. 811; Fl. Rust. vol. i. p. 24.) Leaves linear, tongue-shaped, blunt; flowers capitate; capsule inflated, two-lobed. Sm. Engl. Fl. vol. i. p. 45. Root annual; flowering in April and June.

Professor Martyn observes, that the common English name of this weed probably had its origin from the circumstance of the plants appearing in flower about the time that lambs are dropped. In the English Flora, Sir J. E. Smith has happily separated this plant from *valeriana*, and has thereby lessened the labour and removed the doubts of the young botanist, which always presented themselves, when the botanical characters of this plant came to be compared with those mentioned in the generic character of *valeriana*. The name *fedia*, Sir James Smith observes, as derived from *fedus*, an ancient word, synonymous with *hædus*, a kid, is not unsuitable to this genus. As judicious husbandry will render harmless this humble intruder on tillage lands, I shall just observe, that a small bed of rich garden earth sown with the seeds in August, or in the end of July, will supply an excellent portion of salad throughout the winter, until April.*

9. FLIX-WEED. (*Sisymbrium Sophia*.) Petals smaller than the calyx; leaves finely di-

* It has been long known and used as a salad herb, and lately as an excellent vegetable dish for the table, dressed in the manner of spinage. If sown as above mentioned, the plants will be ready for use when the summer salads are over. I may here be permitted to add, that water-cresses (*Sisymbrium nasturtium*) have lately also been found to afford a salubrious vegetable dish, when dressed in like manner, particularly for invalids.—
EDITOR.

vided, somewhat hairy. Engl. Bot. t. 66.

Root annual ; flowering in June and July.

This is more prevalent on dunghills and rubbish-heaps than in corn-fields. It ripens its seeds in August and September. The pods retain the seeds all winter. The force of gun-powder is said (with what certainty I know not) to be augmented, by mixing a tenth part of the seeds of flix-weed with the other ingredients. The plant is sometimes prescribed in dysenteries and hysteric cases, and the seeds are given to destroy worms.

10. COMMON FUMITORY. (*Fumaria officinalis*.)

Pericarps one-seeded, racemed ; stem diffuse. Engl. Bot. t. 589. Root annual ; flowering all the summer.

This is a very common weed on certain light, sandy soils ; it indicates the want of manure, and the neglect of the drill or row mode of culture. Although cattle and sheep are said to eat it, yet I never could observe, in the course of my experience, any disposition in these animals to touch the plant. It has been recommended by Hoffman, Boerhaave, and Cullen, on account of bitter and saline properties, as a sweetener of the blood, for obstructions of the viscera, black jaundice, bilious cholics, and that class of cutaneous diseases called lepra. It is said also to be an effective cosmetic for removing freckles from the skin.*

* Woodward, Withering, Haller, and Lightfoot.

11. SAND MUSTARD, Isle of Thanet Stink-weed. (*Sinapis muralis*.) Pods ascending on spreading stalks, linear, compressed, slightly beaked; seeds two-ranked; leaves sinuated; stems roughish, with reflexed bristles. Sm. Engl. Flo. vol. iii. p. 224. *Sisymbrium murale*, Engl. Bot. 1090. *Diplotaxis muralis*, De Candolle in Systema Vegetabilium.

Since the above was sent to the press, we had an opportunity of observing this troublesome weed in the Isle of Thanet, to which it seems to be confined. An experienced agriculturist and extensive farmer, (I. A. Champion, Esq. of Sarr,) informs us, that about twenty years since he remembers seeing this weed at Broadstairs, where it was then chiefly confined to the margins of lands lying nearest to the beach. It was said that a vessel laden with corn had been cast away on that part of the coast, and that this noxious weed had been by that means introduced to the Isle of Thanet. Since the time above mentioned, it has overrun the arable land all over the Isle.

Mr. Pitt, in the Introduction to his Essay on Weeds, informs us, that where weeds cover the surface, there is no room for corn; and that where they abound and contend with the corn, they take up the nourishment which the corn should have; and lastly, if weeds be not destroyed, they spoil the crops, and deteriorate the soil. With regard to the identity of the *nourishment* absorbed by corn and by weeds, there may

be some doubt, as it appears by continual experience, that you need only plough and pulverise to have crops of weeds for ever. It is not so with corn. And, moreover, it is equally certain, that poor soils, and those over-cropped, abound with weeds much more than the same soils well cultivated, where useful crops of corn are obtained. This dispute is scarcely worth maintaining; but I believe that weeds do much more harm by obtruding the light, and so choaking the corn, than by the nourishment they absorb. This may be allowed to be demonstrated in the case of young quick hedges. These plants strike downwards, and bring their sustenance very much from below the soil; yet if weeds be suffered to overgrow them annually, they are much injured, and stunted in their growth. In the early part of the growth of corn, let us consider how essential are the functions of the leaves; and for some time after the corn shoots up, the side leaves ought to feel the full effects of light and air; but if weeds interfere, and fill all the intervals that should be, and press upon the crop — growing faster, as some of them do — the crop is deprived not only of nourishment at the root, but of the healthy communication of atmospherical influences with the soil and the plants. It is no answer to say, that *the weeds thrive notwithstanding*; we are speaking of comparatively tender and valuable plants, which are the objects of necessary and expensive cultivation.

But, by whatsoever means the weeds effect the mischief complained of, it is equally necessary to destroy them. Mr. Pitt, in making a few observations on the corn-poppy, observes, that “abundance of it is a pretty sure indication of a light crop.” Upon which he raises this query: “Is the lightness of the crop occasioned by the abundance of this plant, or the increase of this plant encouraged by the lightness of the crop?” To which profound doubt he gives a very careful and ingenious answer: “*Probably both.*” He forgets, however, the rule with which he sets out, “that where weeds cover the surface there can be no room for corn.” But the truth of this matter is, that he takes no notice of soil, nor makes any allusion to the effects of season. Weeds peculiar to gravelly and dry soil, as corn-poppy, blue-bottles, may-weed, and corn-marigold, (among the list of rampant weeds,) as well as corn-bindweed, &c. among fallow-weeds,—feel no effect from drought. The hottest seasons are congenial to them; but the crops of wheat or barley, and sometimes peas likewise, are burnt up at the root by the beginning of July, and thus have gradually, from the commencement of the drought, left the surface to the full occupation of the weeds which prevail. The farmers see that they have no probable interest in resisting this prevalence; and no implement but the sithe or the plough could intercept it. Thus, in hot seasons, and on shallow soils, we see these weeds very numerous in many

places, and the crops worth very little ; but had the season been wet, the crops would have kept a-head, and the farmers would have checked the weeds by such methods as are usual.

I should be sorry if by this explanation it were understood, that this condition of the soil, so full of seeds, and so liable to produce excess of weeds, were at all defended. I have seen such a piece of poor, sandy gravel in Holkham Park, in the hot year of 1818, with a light crop of peas (as it must be), but scarcely more than five plants an acre of corn-poppy ; whereas, before Mr. Coke took it under his own management, it was annually covered with them. In the same Park, I have crossed diagonally over a piece of wheat, measuring forty acres, and found but three plants of cockle, without seeing any other weed. Certainly you cannot have good crops where you are liable to smothering weeds ; the very existence of the weeds shews *poverty* and bad management. In fact, I have seen the poorer convertible land tilled until it would bring no crop, and grass seeds are thrown upon it with the last attempt to get barley. For several years after, it has been perfectly covered with may-weed and other weeds, such as underlings, &c.

Land may be rendered inert or unfertile from an excess of manure, as well as from the want of it, severe and avaricious annual cropping long persevered in being understood in both cases. Over-stimulus, as in the first instance, wears out,

or renders inert, the principle of fertility in the land; and in the latter instance, the want of stimulus produces the same effect. The underling weeds above mentioned flourish and prosper under this state of the land, brought on by either cause. The remedy is therefore obvious, viz. rest; or, give a clear-out summer fallow, and if in the first-mentioned case, (which is to be met with in deep fen land and in old garden mould,) apply a good dressing of lime, and sow down with the superior pasture-grasses and clovers, to remain for not less than five years. In the latter case, or where the fertility of the soil is worn out by injudicious cropping and a niggardly supply of manure, joined to the naturally thin and poor staple of the soil, then a full application of manure, or marl and manure, the latter consisting as much as possible of cow-dung, should be given, and the land sown down with the superior permanent pasture-grasses suited to the soil, with a due admixture of clover.

OF PASTURE WEEDS.

THE most noxious weeds which infest grass lands or pastures, have been mentioned in the *Hortus Gramineus Woburnensis*,* and the reme-

* *Hortus Gramineus Woburnensis*: or, an Account of the Results of Experiments on the Produce and Fattening Qualities of Different Grasses and other Plants, &c. &c. Published by Ridgway, London, 1825.—EDITOR.

dies for their destruction stated in that work; we shall here, therefore, enter less into detail.

1. DWARF-THISTLE, STEMLESS THISTLE.
(*Carduus acaulis*.) Engl. Bot. 161; Hort.
Gram. Wob. 2d Ed. p. 327.
2. COMMON CAMOMILE. (*Anthemis nobilis*.)
Engl. Bot. 930; Hort. Gram. Wob. 2d Ed.
p. 328.
3. STAR-THISTLE. (*Centaurea calcitrapa*.)
Engl. Bot. 125; Hort. Gram. Wob. 2d Ed.
p. 329.
4. OX-EYE DAISY, MAUDLIN WORT.
(*Chrysanthemum leucanthemum*.)
5. GREAT FLEABANE, PLOUGHMAN'S
SPIKENARD. (*Conzys squarrosa*.) Engl.
Bot. 1195; Hort. Gram. Wob. 2d Ed. p. 329.
6. CHEESE RENNING, YELLOW LADIES'
BEDSTRAW, PETTY MUGUET. (*Ga-
lium verum*.) Engl. Bot. 660; Hort. Gram.
Wob. 2d Ed. p. 329.
7. LONG-ROOTED HAWK-WEED. Engl.
Bot. 831; Hort. Gram. Wob. 2d Ed.
p. 330.
8. WILD THYME, MOTHER-OF-THYME.

- (*Thymus serpyllum*.) Eng. Bot. 1514;
Hort. Gram. Wob. 2d Ed. p. 330.
9. SHEEP'S SORREL, or DOCK. (*Rumex acetosella*.) Eng. Bot. 1161; Hort. Gram. Wob. 2d Ed. p. 331.
10. KNOT-GRASS, SNAKE-WEED, RED-WEED. (*Polygonum aviculare*.) Eng. Bot. 1252; Hort. Gram. Wob. 2d Ed. p. 331. This has already been noticed under the head of "Fallow Weeds."
11. YELLOW-RATTLE, or COCK'S-COMB, COCK-GRASS, PENNY-WEED, HENY PENNY, &c. (*Rhinanthus crista galli*.) Eng. Bot. vol. x. 567.
12. COMMON CARLINE THISTLE. (*Carlina vulgaris*.) Eng. Bot. vol. xvi. 1144.

The above are more frequently found to infest dry, sandy pastures and calcareous soils, than loamy or damp grass lands. Where they prevail to a great extent, there is no remedy like breaking up the land, and taking a course of crops; for palliative remedies are of little avail. The thistles, sheep's-sorrel, and knot-grass, are the most formidable. Hand-weeding, when the weeds are confined to local spots, and are only just beginning to spread generally over the soil, will be found effectual; but when once the pasture becomes generally infected with the seeds and

roots of these plants, no time should be lost in using the plough, harrow, and horse-hoe, and a judicious course of cleansing crops before returning the land again to permanent pasture.

PASTURE weeds which generally prevail in loamy soils, and such also as are prevalent in clayey and damp soils are principally as follow.

1. YELLOW GOAT'S-BEARD. (*Tragapogon pratensis.*) Engl. Bot. vol. vii. t. 434.
2. MARSH-THISTLE, or RED-THISTLE. (*Carduus palustris.*) Engl. Bot. vol. xiv. t. 974. This is almost confined to wet, damp pastures.
3. MELANCHOLY-THISTLE. (*Carduus heterophyllus.*) Engl. Bot. vol. x. 675.
4. MEADOW-THISTLE, or SMALL PURPLE THISTLE. (*Carduus pratensis.*) Engl. Bot. vol. iii. 177.
5. COMMON BUTTER-BUR, or PESTILENT-WORT. (*Tussilago petasites.*) Engl. Bot. vol. vi. 431. Moist meadows.
6. COMMON RAGWORT, RAGWEED, STAGGERWORT, ST. JAMES'S WORT. SEGGRUM, SCOTCH, CANKER-WEED, STINKING EL-

SHINDER, &c. &c. (*Senecio Jacobæa*.)
Engl. Bot. vol. xvi. p. 1130.

7. COMMON DAISY, BAIRN WARTS, &c.
(*Bellis perennis*.) Engl. Bot. vol. vi.
p. 424.

8. COMMON BLACK KNAP-WEED, BLACK
MATFELLOW, BULL-WEED, COCK-
HEADS, &c. (*Centaurea nigra*.) Engl.
Bot. vol. iv. p. 278.

9. BROAD-LEAVED DOCK. (*Rumex obtusi-
folius*.) Sm. Engl. Flo. vol. ii. p. 192;
Engl. Bot. t. 1999.

10. ORCHIS. Of this weed there are several
species, viz. *Orchis mascula*, Engl. Bot.
t. 631; *Orchis maculata*, Engl. Bot. t. 632;
Orchis latifolia, Engl. Bot. t. 632; *Orchis
morio*, Engl. Bot. 2059; *Orchis pyramidalis*,
Engl. Bot. t. 110: they are chiefly con-
fined to damp pastures that require drain-
ing. Man-orchis, Red-lead, and Frog-
wort, are the only English names we have
heard given to these weeds in damp
pastures, where they are but little formid-
able. In the flower-garden they are con-
sidered interesting ornaments.

11. COMMON COW-PARSNIP, HOG-WEED.
(*Heracleum sphondylium*.) Leaves pinnate;

leaflets pinnatifid, cut, and serrated. Sm. Engl. Fl. vol. ii. p. 102; Engl. Bot. vol. xiv. p. 102.*.

12. **SEDGE.** (*Carex*.) This is a numerous family of coarse, grass-like plants, chiefly confined to damp sour soils; they are innutritious, and but seldom or ever touched by cattle. To enumerate all the different species of this genus, of which there are upwards of fifty, would here be of little or no utility. The essential family, or generic character, is as follows: Flowers unisexual, imbricated; calyx of one leaf; corolla wanting. Female flowers with an inflated three-toothed nectary; stigmas three; seed three-sided, enclosed in the nectary. The flowers, or the seed, will at once enable the farmer to distinguish every species of sedge from the true or proper grasses.

* In that national work, the English Flora, (which should be in the hands of every gentleman who wishes to possess an accurate description of every British plant,) Sir James Edward Smith has so completely and successfully reformed and perfected the generic and the discriminating characters of the natural order of plants, the umbelliferæ, to which the cow-parsnip above belongs, that what was before doubtful and uncertain in all previous descriptions of these plants, is now in the English Flora rendered clear and certain, by the very successful reformation of the generic characters. The young botanist cannot be too grateful for this clearance away of his former difficulties, which were numerous and discouraging.—EDITOR.

We once examined a sample of meadow hay said to possess very fattening properties, in which was found an inconsiderable quantity of the *carex incurva*, but the superior permanent pasture grasses constituted the bulk of the hay: it also contained a considerable portion of burnet (*Poterium sanguisorba*). The warm or stimulant nature of the burnet as a winter food, combined with turnips, will readily account for the superiority of this hay, without the agency of the curved-leaved sedge, which was here in too small a quantity to affect the quality of the hay either way.

To the above list of pasture weeds many other plants could be added, if any good were likely to result from their being enumerated here; but as they are only occasionally found, and the foregoing being destroyed or eradicated out of pastures, these will be found harmless,—we shall therefore pass them over.*

* Since the above was printed, a very intelligent and experienced agriculturist, (David Denne, Esq. of Little Grays, Kent,) informed us, that in the marshes, the low flat lands bordering on the Isle of Thanet, a very noxious weed infests some of these valuable pastures: this weed they call spurt-grass. We had the pleasure of being shewn these pastures by that gentleman, from whom we received every information we could desire on the subject. We examined this weed; and from the characters of the root, stem, and leaves, (for it was not then in flower,) we have no doubt but that it is the *Scirpus maritimus*, or salt marsh club-rush. In botanical collections we have cultivated this pest of certain pastures; the root creeps powerfully, and is large, as a creeping root, in proportion to the size of the plant. Palliative

The means to be adopted for the extirpation of these noxious weeds in pastures, must be regulated by the nature of the soil, and the comparative prevalence of the weeds. In good pasture land, where, from accident or neglect, these weeds, in part or wholly, have insinuated themselves, hand-weeding may most advantageously be had recourse to; and particularly for the larger weeds, such as thistles, rag-weed, docks, and knap-weed; it will be found the best temporary remedy. Should the coarseness of the pasture have been occasioned by too frequent *haying*, then depasturing closely for two or three years, with a good top-dressing of dung-compost applied in the early part of the spring, or late in the autumn, with strict attention to hand-weeding, will be found effectual to recover the pasture and extirpate the weeds. We have witnessed pasture land of the best quality brought to produce little else than the coarse

remedies to get rid of this plant will be found of no avail. The only effective mode is to pare and burn the surface, take a course, or courses, of crops, in order to destroy every particle of the roots: one course of crops may be sufficient, as the roots are large, particularly if the *hand and fork* is not spared in assisting the plough and harrows. When cleansed, the land should be prepared for the seeds of the superior permanent grasses, by applying to the surface a top-dressing of compost of rotten dung and mould, or ashes; this to be spread on the surface, and merely harrowed in it. This will be found an excellent bed for the seeds. For the best kinds of grasses, quantity of seed, and mode of sowing, consult *Hortus Gramineus Woburnensis*, where full directions are given.—EDITOR.

grasses, from having been kept for a series of years under the sithe for hay; and, at the same time, land of the same quality, separated only by a fence from the farmer, producing the richest quality of herbage from being regularly depastured. On poorer soils, however, the bad effects of too close feeding were evident,—daisies, procumbent trefoil, mosses, and annual meadow-grass, prevailed over the superior grasses of the pasture. On this kind of soil, moderate depasturing, and a crop of hay in two or three years, had the effect of encouraging the superior grasses to overcome these dwarf unproductive plants. Frequent top-dressings are of the greatest use in effecting the above improvements on deteriorated thin pasture lands, as regards the destruction of weeds, as well as of improving the quality of the pasture.

In crops of artificial grasses, such as sainfoin, lucern, &c., when the dwarf thistle prevails, and when it is impracticable under such circumstances to draw out this weed without injuring the crops, a good remedy will be found in the use of common salt. An enlightened agriculturist, T. B. Evans, Jun. Esq., informs us, and authorises us to state the fact, that common salt dropped on the crown of this weed effectually destroys it, without injury to the crop of grasses. Children may be employed to apply the salt by the hand to the weeds; and, when we consider how much more expeditiously and safely this remedy may be used on crops of sainfoin, lucern, and clover, in comparison to that of pulling the weeds up by

the roots, it is, doubtless, a valuable discovery. When the sedges, marsh thistle, pestilent wort, &c. prevail in meadows, then recourse must be had to other means than that of hand-weeding, viz. draining, paring and burning, liming, and a judicious rotation of crops under the horse-hoe husbandry, until every vestige of the seeds and roots of these noxious weeds disappear. The ground may then be laid down to permanent pasture, with the seeds of the most valuable species adapted to the soil, and where water can be commanded, converted to water-meadow, by which the value of the land will be considerably increased.*

* See Hortus Gramineus Woburnensis, 2d Ed. p. 379.

APPENDIX.

*Some Account of an effectual Mode of Cleansing heavy Lands infested in a high degree with Fallow-weeds, particularly with Couch-grass (*Triticum repens*), without the aid of Naked Fallow; as practised by Mr. R. DICKSON, of Kidbrook, Blackheath.—
By the EDITOR.*

THE triumph of skill and perseverance over that powerful enemy to good husbandry on tenacious, damp soils, viz. the worst of fallow weeds—*couch*, we believe was never more satisfactorily demonstrated than by Mr. Robert Dickson, on his farms at Kidbrook, Blackheath. The soil of this part of his farm, to which the following observations are confined, so overcome with couch-grass, is a strong, tenacious clay, and in some parts approaching to cementing gravel. Large portions of the land, when Mr. Dickson entered on the lease, was extremely foul with fallow-weeds; particularly couch-grass. The rent being high, to have attempted the cleansing of all this land by the only known means of naked fallows, or more expensive process of forking out, would have been attended with great loss, if not with ruinous consequences. We shall here content ourselves with stating what we have witnessed

of this very excellent practice, referring our readers to a view of Kidbrook farm for full demonstrative evidence of the merits of this valuable practice. A field, containing 83 acres of the nature and condition above described, came into Mr. Dickson's hands at Christmas last; the previous crop had been potatoes and white crops; two ploughings and harrowings had been given after the white crop was taken, and the land raised up to be ameliorated by the winter frosts. In the month of April following, when we first saw the field, its surface could not be distinguished from the adjoining pastures, so matted, full, and chain-bound with couch-grass, was this tenacious, obdurate soil. By a series of combined operations, with implements accurately adapted for the purpose, partly new, and partly improved by himself, Mr. Dickson accomplished in a few days all the effects of a clear out-summer naked fallow, without the loss of time and crop always attending on this hitherto unavoidable operation for cleansing neglected couch-bound land. It is well known that strong lands cannot be cleaned for a turnip crop the same season. In one day the same land is ploughed, cleaned, manured, and planted with potatoes; and by the judicious use of his hoeing implements and rotation of crops,* Mr. Dickson

* The Kidbrook farm consists of 620 acres; viz. wheat 100, tares 60, potatoes 60, beans 30, oats 40, barley 30, clover 100, meadow 170. But the rotation varies according to circumstances connected with green crops raised for market. The breadth of potatoes every year allows of the above practice, saving so much naked fallow every season.

completely keeps down and suppresses any attempt of the couch to gain possession, until its enfeebled roots give way altogether to the ordinary mode of culture.

The implements required to effect the above important objects on a strong, tenacious soil, are,

1st. Hally's plough.

2d. Morton's revolving harrow, (invented and made by that ingenious mechanic, Mr. Morton, of Leith,) as improved by Mr. Dickson. This powerful and effective implement is so contrived as to allow the horses to walk in the furrows.

3d. Improved drag-harrow, by Mr. Dickson, in four parts for corn, eight feet land. This is also constructed in such a manner, as to allow of the full and complete working of the harrow, while the horses walk in the furrows, thereby saving their feet when the soil is dry, and composed of hardened lumps on the surface; or, when *green*, prevents the serious injury occasioned by poaching with the horses' feet.

4th. A heavy cast-iron cylinder roll, in two parts, with an improved knife for cleaning it when working.

5th. New improved drill grubber. This implement is constructed so as to accommodate itself to every breadth of the drill husbandry, as regards green fallow crops, such as turnips, potatoes, beans, peas, &c.: it will work in any soil, however dry and stiff.

6th. Improved grubber for pulverising and broad sharing: by means of three coulter, which

are readily affixed to the implement, it acts as a broad sharer.

This last-mentioned implement is one of great merit and utility, it produces a friable surface-soil, for moulding up and for encouraging the growth of the plants, which, on *cementing*, heavy, *obdurate* soils, cannot be effected by any other implement yet invented.

We shall now endeavour to state, in as few words as possible, the mode of using these implements as practised by Mr. Dickson, to produce the above-mentioned important practical results, and which we had an opportunity of witnessing.

Hally's plough is used in the first operation; this is followed by Morton's revolving harrow: the effect of this implement is astonishing in separating and breaking down the tenacious chain-bound soil, and shaking out the roots of couch. As before observed, this implement is so constructed, as to allow of the horses walking in the furrows,—a point of the greatest importance in working a soil of this nature, whether it happen at the time to be in a dry or in a damp state. The couch being now loosened from the soil, the improved drag-harrows are applied to collect it; this they appear to do in a more effectual and expeditious manner than any other kind of harrow we have seen. When this operation is finished, a heavy cast-iron roller is used, to level the surface for spreading the manure; the roller is furnished with a knife, so constructed or applied, as to keep the surface of the roller always clean when work-

ing. The surface being thus levelled, and the manure spread, the last ploughing is given; the potatoes are either planted in the furrow, or afterwards dibbled in, according as circumstances or convenience may direct. It is hardly possible to witness these operations of good husbandry; (required, as they are, imperatively, under such circumstances of soil as above mentioned,) without feeling a high gratification.

At this time, June 27, the crop of potatoes so planted look remarkable well, the land being comparatively clean, and the plants healthy, although the season has been very unfavourable for this description of land, which in dry weather becomes so indurated, as to resemble in some degree a solid mass of stone.

As soon as the plants appear above ground in the rows, the drill-grubber, before mentioned, is used to clean and loosen the soil. As this excellent implement is constructed so as to accommodate itself to any breadth of the drill husbandry with respect to green crops, it may be used for the bean, pea, and turnip crop, as well as for potatoes; on the most tenacious clay it produces a friable surface-soil for moulding up, it effectually reaches the couch, and by its effects in loosening and breaking the hardened soil, greatly benefits the health of the plants. Wheat crops in Kent, Surrey, and Essex, have severely suffered this season from the slug; salt and other topical remedies have been tried, but without the *least perceptible* beneficial effect. This crop, after clover,

tares, and beans, has failed this season at least one-third. In wet seasons, the slug propagates with such rapidity, that a wheat crop, after these green crops, is very uncertain, and may be said always to fail. Mr. Dickson has happily adopted a practice which is found to be effectual, in preserving and securing the wheat crop under such circumstances. The following are the principles on which this valuable practice is founded :—The slug, as before observed, prospers under favour of the wet season; the clover, beans, and tares, afford the very best possible shelter and food for this destructive enemy to the wheat crop. At the end of autumn, when the plough is put into the leg, myriads of the slug, in its various stages of life, from the egg to the full grown devourer, lying near to, and on the surface of the land, are by the ordinary practice of deep ploughing, placed below, and out of the reach of harm, until spring, or favourable open weather during winter, encourage them to come out. But, instead of the autumn deep ploughing, as ordinarily practised, Mr. Dickson ploughs at first only from two to three inches deep; if the land is on the flat, he uses his grubber and scarifier, which cuts to the depth of from two to three inches, and $4\frac{1}{2}$ feet wide, and which performs the work exactly of five ploughs. The eggs of the slug are here brought to the surface, and exposed to the effects of the sun and air, which, as far as regards the eggs, is completely effective in causing their destruction, as well as lessening the number of the perfect slugs. This

accomplished; the usual depth of ploughing is given at the proper season. Two pieces of wheat on the same field exemplified this in a striking degree this season; the crop of the one, which had been treated according to the common practice of first deep autumn-ploughing, had to be ploughed up in the spring, as scarcely a single plant of wheat was left by the slug, although the braird of young plants at first was strong and healthy. On the other piece of wheat, which had been treated as above, the crop was full and excellent.

Since the above was sent to the press, I was much gratified to receive the following information from an enlightened agriculturist (Thomas Neames, Esq. of Chislet). Last season Mr. Neames had a large ley field; a portion of the ley he scarified, or broke and stirred the surface until the surface plants were all destroyed, or nearly so. The other portion of the ley was ploughed in the ordinary manner; the scarified portion was also now ploughed, and treated in the usual way for wheat. In the spring, the scarified piece was scarcely deficient of a plant, and the crop proved an average one; while the other portion of the field, which was treated in the usual way, had nearly the whole crop destroyed by the slug.

It seems clear, therefore, that all the surface plants of the ley should be completely destroyed by scarifying and harrowing, or by shallow ploughing and harrowing. By these means the slugs and their eggs are destroyed, as well as the

food which would have supported them until the wheat plants were fit for their ravages.

Facts such as these, on a subject of so much practical importance as this, are highly pleasing, for they afford proofs at once clear and satisfactory, and beyond the reach of doubt.

THE END.

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ERRATA.

Page 20, line 11 from top, *for Sandyx, read Scandyx*.
 — 71, line 19 from the top, *for was, read were*.
 — 76, line 15 from the top, *for leg, read ley*.

In the List of Books quoted, *after* Comp. Fl. Brit., *add* Compendium
 Floræ Britannicæ, autore Jacobo Edwardo Smith, Equ. Aur. M.D.







